NOKIA

**C33525.90_H0**
**Nokia MetroHub Transmission Node Rel. C3**

# Installing Nokia MetroHub

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CE Hereby, Nokia Corporation, declares that these Transmission Node units measured in Nokia MetroHub are in compliance with the essential requirements of the Directive 1999/5/EC (R&TTE Directive) of the European Parliament and of the Council.

UL Complies with UL 1950, CSA 22.2 NO. 950 Information Technology Equipment. This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions. (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

## Contents

# 1 Delivery contents of Nokia MetroHub

## 1.1 Delivery content of Nokia MetroHub transportation package

The transportation package also includes other equipment needed in the installation of Nokia MetroHub. Furthermore, there is optional equipment available to ease the installation.

**Items included in all deliveries**

The following items are always included in the transportation package:

- Nokia MetroHub cover and chassis with the ordered units. Shielding units are installed in the slots which are not occupied by functional units. The optional battery unit comes in a separate package.
- T-shaped mounting rack for providing the fixing base to MetroHub. Two Allen screws (M6x20) for fixing the cabinet to the mounting rack are attached to the rack.
- four unit retaining screws (spares). Note that there are three spare counterparts for these screws fixed on the mechanics on the top of the cabinet.

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Note

In the transportation package, Nokia MetroHub is attached to the mounting rack. The mounting rack is further attached to wooden spacer blocks.

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- cable cover and cable cover support.

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Note

The uncabled connectors of the units are protected with rubber caps. Leave the cap on the connector, if the connector is not going to be used for cabling.

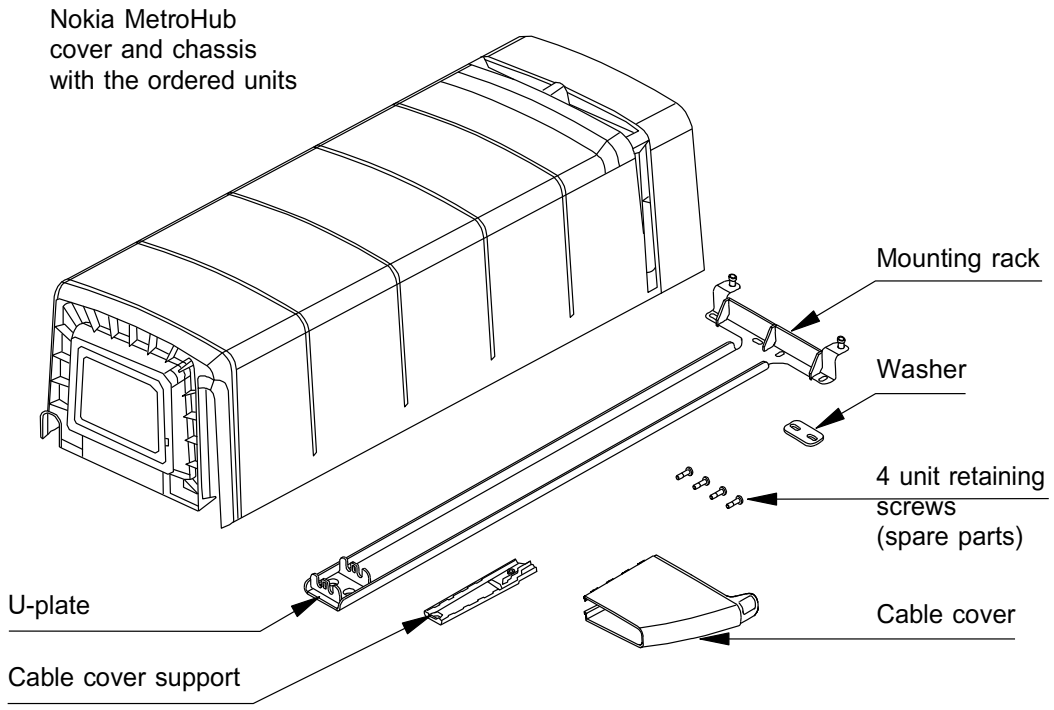


Figure 1. Contents of Nokia MetroHub transportation package (without the pole mounting kit)

## 1.2 Delivery contents of the pole mouting kit

The pole mounting kit can be ordered as an option. The pole mounting kit consists of the following items:

- two front blocks
- two back blocks
- four Allen screws (M6x20) for fixing the mounting rack to the pole brackets
- four M8x120 bolts

- four washers
- four square nuts 20x20x4 mm
- two metal bands, each 1010 mm (39.8 in) long
- two locking devices (Scruseal clamps)

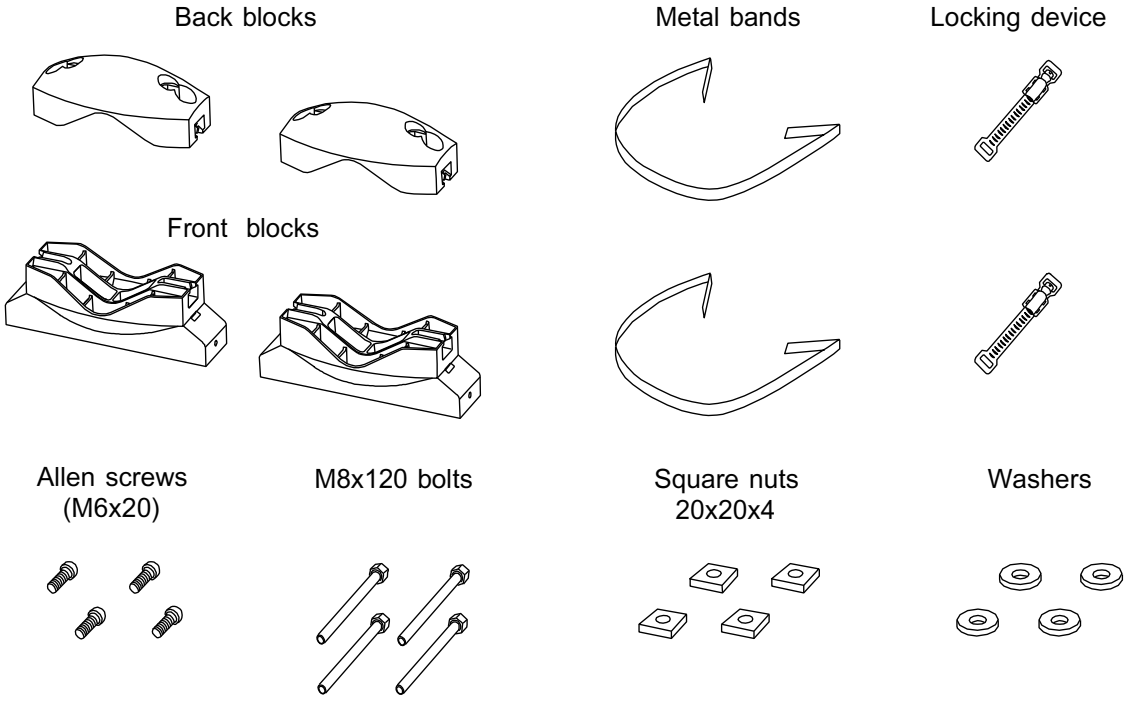


Figure 2. Contents of the pole mounting kit

# 2 Site requirements for Nokia MetroHub

## 2.1 Nokia MetroHub impact on existing sites

If MetroHub is installed at an existing site, where there are already other MetroHubs, a BTS or other telecom equipment installed the following needs to be taken into account:

- the site needs to be properly surveyed and prepared, and all required external services correctly installed. The site survey must identify any special requirements for the installation, such as lifting equipment.
- make sure that the *installation requirements* can be fulfilled for the MetroHub to be installed.
- check that the *space requirements* are fulfilled not only for MetroHub, but for the other devices at site too, taking the new MetroHub to be installed into account.
- if it is necessary to move other equipment to free space for installing Nokia MetroHub and to fulfil the clearance requirements, then pay attention to any cables connected to any device so that they are not put under strain, which can cause damage to them. Especially the bending and strain requirements for optical fibres need to be taken into account.
- take note of the applicable *warnings and cautions* and national legislation when working with the power supply and connecting the power input to Nokia MetroHub. All power and grounding cabling must meet the requirements of the local and national safety regulations. Depending on the set-up of the existing site this can mean that the entire site has to be powered down.
- check that the used source for the AC or DC power for MetroHub is within the limits for the site. The power consumption of the new MetroHub adds to the power consumption of the existing devices at the site.
- if MetroHub will be using the general site battery backup system, the battery backup time for the site will decrease.

## 2.2 Overview of site requirements for Nokia MetroHub

Before installing Nokia MetroHub, the site needs to be properly surveyed and prepared:

- to verify that it is in line with the *environmental requirements*.
- if MetroHub is to be installed at location where it is not protected from direct weather influences, refer to the *operating conditions* that must be met.
- refer to the *space requirements* that needs to be met before deciding where to install MetroHub.

If MetroHub is held in storage before being installed, the *storage conditions* must be met.

If MetroHub is to be transported, refer to the *transportation requirements*.

## 2.3 Environmental requirements for Nokia MetroHub

Table 1. Environment

| | |
|---|---|
| *Storage* | |
| Temperature range | -25 to +70°C (-13 to 158°F) |
| Solar radiation | 700 W/m$^2$ |
| Relative humidity | 5 - 95% |
| Temperature change rate | 0.5°C/min (0.9°F/min) (averaged over a period of 5 min) |
| *Transportation* | |
| Temperature range | -25 to +70°C (-13 to 158°F) (air in un-ventilated enclosures) |
| Solar radiation | 1120 W/m$^2$ |
| Relative humidity | < 95% |
| Temperature change air/air | -25/+30°C (-13/86°F) |
| *Operation* | |

Table 1. Environment (cont.)

| | |
|---|---|
| Temperature range | -40 to +50°C (-40 to 122°F) |
| Solar radiation | 1120 W/m$^2$ |
| Relative humidity | ≤ 100% |
| Temperature change rate | 0.5°C/min (0.9°F/min) (averaged over a period of 5 min) |
| Ingress Protection Class | IP 55<br>UL 50-3R |

## 2.4 Storage conditions for Nokia MetroHub

The following environmental conditions must be met when Nokia MetroHub is held in storage.

Caution

Nokia MetroHub must be stored in its original package before the installation.

#### International standard for storage

According to the ETS 300 019-1-1:1992, the class for Nokia MetroHub is Class 1.2: weather-protected, partly temperature-controlled storage locations.

#### Climatic conditions for storage

The climatic conditions during the storage of Nokia MetroHub are presented in the following table (according to ETS 300 019-1-1:1992).

Table 2. Climatic conditions for storage

| Environmental parameter | Value |
|---|---|
| Low air temperature | -25°C<br>-13°F |
| High air temperature | +70°C<br>+158°F |
| Low relative humidity | 10% |
| High relative humidity | 100% |
| Low absolute humidity | 0.5 g/$m^3$ |
| High absolute humidity | 29 g/$m^3$ |
| Rain intensity | none |
| Temperature change rate (average of 5 min.) | 0.5°C/min<br>0.9°F/min |
| Low air pressure | 70 kPa<br>10.15 psi |
| High air pressure | 106 kPa<br>15.37 psi |
| Solar radiation | 1120 W/$m^2$ |
| Surrounding air movement | 30 m/s<br>98 ft/s |
| Conditions of condensation | yes |
| Conditions of precipitation (rain, snow, hail) | yes |
| Low rain temperature | none |
| Conditions of water from sources other than rain | dripping water |
| Conditions of icing and frosting | yes |

### Mechanical conditions for storage

Nokia MetroHub complies with ETS 300 019-1-1:1992 Class 1.2.

## 2.5 Transportation requirements for Nokia MetroHub

The following environmental conditions must be met when Nokia MetroHub is tranported.

Caution

Nokia MetroHub must be transported in its original package before the installation.

Note

Nokia MetroHub is delivered to the customer with the ordered plug-in units pre-installed. The battery unit comes in a separate package.

### International standard for transportation

According to the ETS 300 019-1-2:1992, the class for Nokia MetroHub equipment is Class 2.2. This class applies to those cases of transportation where special care has been taken, for example, with respect to low temperature and handling.

Note

The typical transportation time is considered to be 30 days or less. When the total transportation time exceeds 30 days, additional storage or packaging precautions must be considered.

### Climatic conditions for transportation

The climatic conditions during transportation are presented in the following table (according to ETS 300 019-1-2:1992).

Table 3. Climatic conditions for transportation

| Environmental parameter | Value |
|---|---|
| Low air temperature | -25°C<br>-13°F |
| High temperature, air in unventilated enclosures | +70°C<br>+158°F |
| High temperature, air in ventilated enclosures or outdoor air | +40°C<br>+104°F |
| Temperature change air/air | -24/+30°C<br>-11/+86°F |
| Temperature change air/water | +40/+5°C<br>+104/+41°F |
| Relative humidity, not combined with rapid temperature changes | 95%+40°C<br>95%+104°F |
| Relative humidity, combined with rapid temperature changes air/air, at high relative humidity | 95%-25/+30°C<br>95%-13/+86°F |
| Absolute humidity, combined with rapid temperature changes air/air, at high water content | 60 g/$m^3$ +70/+15°C<br>60 g/$m^3$ +158/+59°F |
| Low air pressure | 70 kPa<br>10.15 psi |
| Change of air pressure | none |
| Surrounding air movement | 20 m/s<br>65.6 ft./s |
| Precipitation, rain | 6 mm/min<br>0.24 in./min |
| Radiation, solar | 1120 W/$m^2$ |
| Radiation, heat | 600 W/$m^2$ |

Table 3. Climatic conditions for transportation (cont.)

| Environmental parameter | Value |
|---|---|
| Water from sources other than rain | 1 m/s<br>3.28 ft/s |
| Wetness | none |

#### Mechanical conditions for transportation

For mechanical conditions during transportation, Nokia MetroHub complies with ETS 300 019-1-2:1992 Class 2.2.

## 2.6 Operating conditions for Nokia MetroHub

The following environmental conditions must be met during the operation of Nokia MetroHub at locations which are not protected from direct weather influences.

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Note

When surveying the prospective sites, consider the values presented in this section.

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Operating conditions are defined as stationary: the equipment is mounted on a structure, or on a mounting device, or it is permanently placed at a certain site. Nokia MetroHub is not intended for portable use.

#### International standard for operation

According to the ETS 300 019-1-4:1992, the class for Nokia MetroHub is Class 4.1.

#### Climatic conditions for operation

For climatic conditions during operation, Nokia MetroHub complies generally with Class 4.1 as presented in the following table. However, for the temperature and humidity values the table presents extended operational climatic conditions, which differ from Class 4.1. The weather shielding of Nokia MetroHub is valid when the node is mounted in the recommended positions.

Table 4. Climatic conditions for operation (Class 4.1, partly extended)

| Environmental parameter | Class 4.1 value | Extended value for Nokia MetroHub |
|---|---|---|
| Low air temperature | -33°C<br>-27°F | -40°C<br>-40°F |
| High air temperature | +40°C<br>+104°F | +50°C<br>+122°F |
| Low relative humidity | 15% | - |
| High relative humidity | 100% | - |
| Low absolute humidity | 0.26 g/$m^3$ | 0.03 g/$m^3$ |
| High absolute humidity | 25 g/$m^3$ | 36 g/$m^3$ |
| Rain intensity | 6 mm/min<br>0.24 in./min | - |
| Temperature change rate (average of 5 min.) | 0.5°C/min<br>0.9°F/min | - |
| Low air pressure | 70 kPa<br>10.15 psi | - |
| High air pressure | 106 kPa<br>15.37 psi | - |
| Solar radiation | 1120 W/$m^2$ | - |
| Heat radiation | insignificant | - |
| Surrounding air movement | 50 m/s<br>164 ft/s | - |
| Conditions of condensation | yes | - |

Table 4. Climatic conditions for operation (Class 4.1, partly extended) (cont.)

| Environmental parameter | Class 4.1 value | Extended value for Nokia MetroHub |
|---|---|---|
| Conditions of precipitation (rain, snow, hail etc.) | yes | - |
| Low rain temperature | 5°C<br>41°F | - |
| Conditions of water from sources other than rain | splashing water | - |
| Conditions of icing and frosting | yes | - |

### Mechanical conditions for operation

For mechanical conditions during operation, Nokia MetroHub complies with ETS 300 019-1-4:1992 Class 4.1.

### Ingress protection

The electronic components inside the units of Nokia MetroHub are protected against the ingress of rain, snow and dust to the minimum level of IP55 of European standard EN 60529 and level 3R of UL standard 50.

### Acoustic noise

The maximum acoustic noise generated by Nokia MetroHub is 61 dB (A) in an outdoor environment and 55 dB (A) in an indoor environment of up to 30°C (86° F). The acoustic noise is measured according to ISO 3744. The noise is sound power.

The fan unit of MetroHub generates the acoustic noise. The level of acoustic sound power is dependent on the ambient temperature and the configuration. Refer to the figure below for the range of acoustic sound power level in different ambient temperatures.

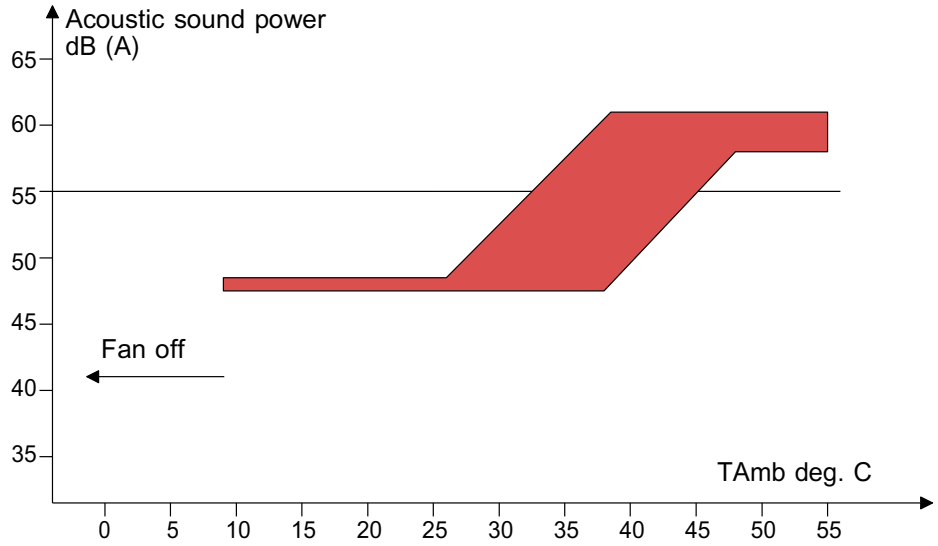


Figure 3. Range of acoustic sound power

### EMC shielding

The cabinet and the units of Nokia MetroHub together provide the EMC shielding. The EMC shielding complies to the requirements set by the European standard EN 300 386-2 V1.1.3 (1997-12).

### Safety

The cabinet fulfils the relevant safety safety requirements: EN 60950 and IEC 950. Grounding conforms to ETS 300 253: 1995.

## 2.7 Space requirements for Nokia MetroHub

Nokia MetroHub can be mounted on a wall or pole. Horizontal mounting on a roof or on the floor is also possible with some limitations.

### Nokia MetroHub dimensions

The dimensions of MetroHub are presented in the figure below.

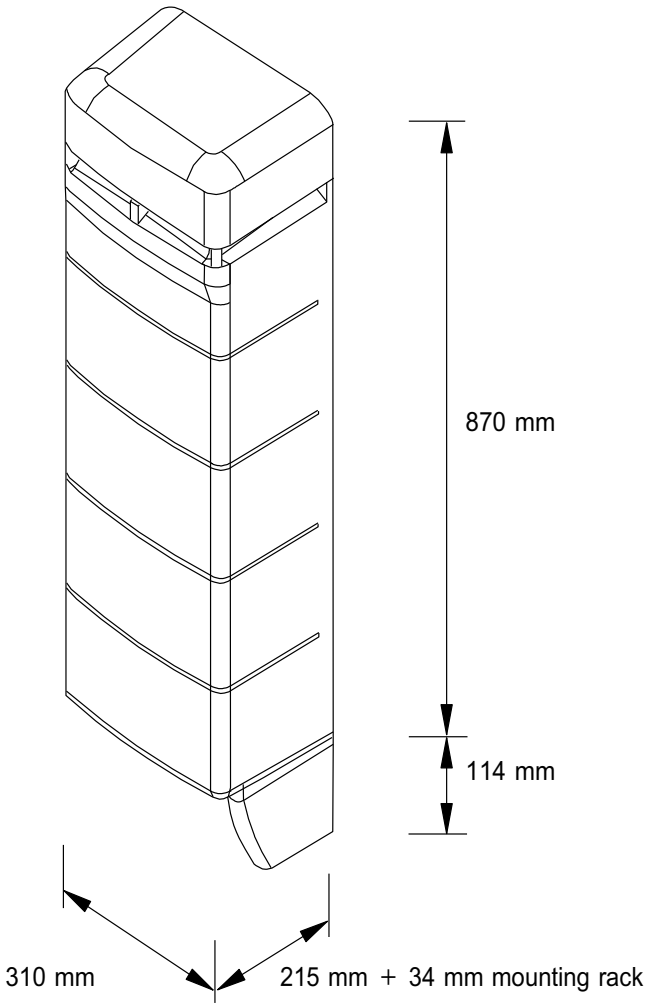


Figure 4. Dimensions of Nokia MetroHub cabinet

**Clearances around Nokia MetroHub**

Nokia MetroHub is cooled through natural convection and the fan unit. This sets requirements on the clearances around the equipment. Different installation types also set requirements for the clearances.

The packing cardboard provides a template for defining the clearances around MetroHub and for marking the drilling holes needed for wall mounting. Use the template for defining how much space is required

- for removing units on the right-hand side of MetroHub,
- for removing the cover above MetroHub,
- for hanging the cover on the left hand side of MetroHub and
- for cables and for cooling under MetroHub.

Refer to *Attaching the mounting rack to the wall* for more information on how to use the template.

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Note

In order to hang the cover at the side of the cabinet, a clearance of 250 mm (10 in) to the left side is required.

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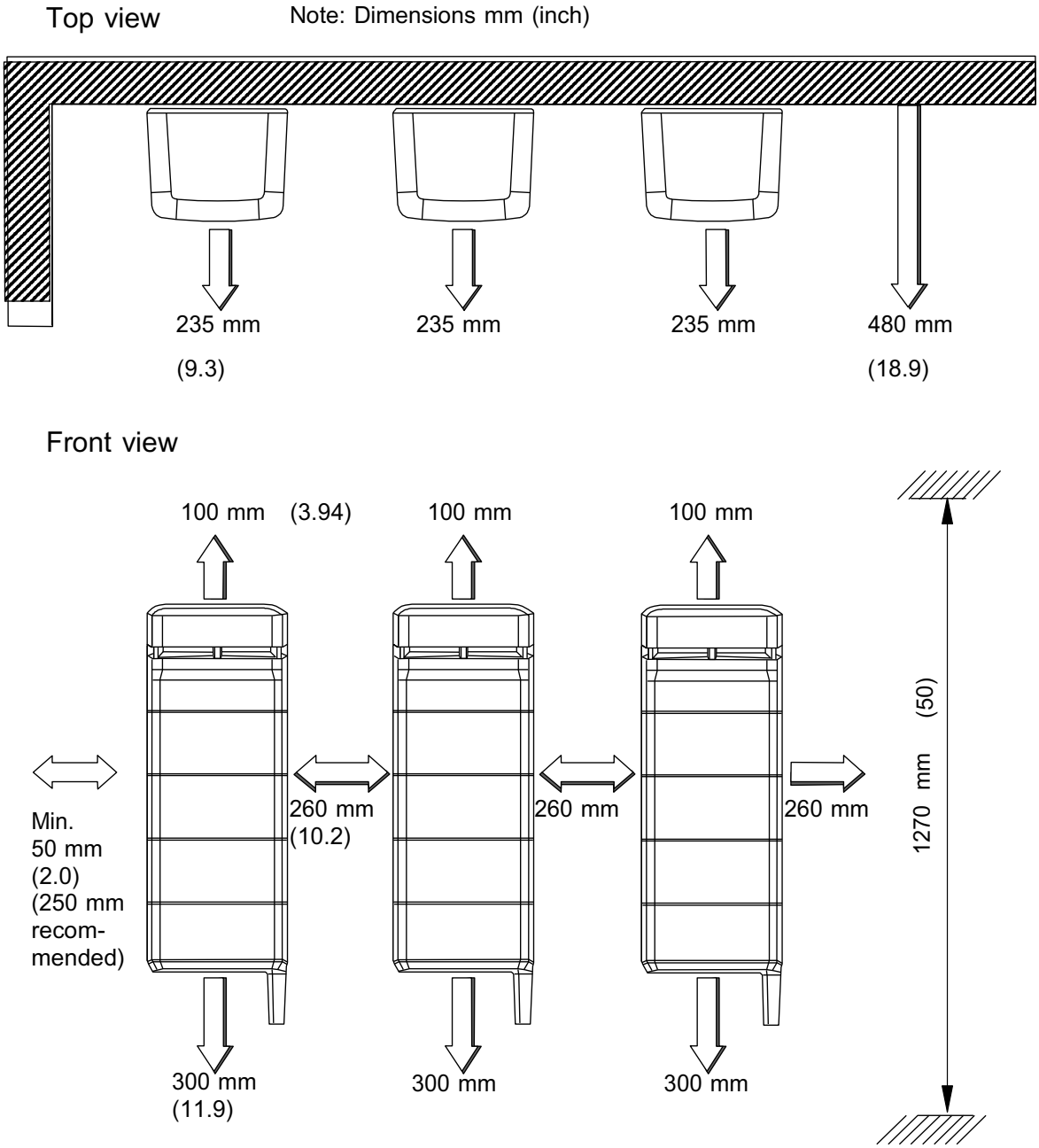


Figure 5. Clearances around MetroHub

## 2.8 Pole/wall requirements for the cabinet

Qualified personnel must inspect the installation wall and/or pole before mounting MetroHub. Ensure that the installation wall or pole is strong enough to bear the weight of MetroHub (max. 45 kg/99.1 lb.) in any condition. The optional pole mounting kit can be used when the installation pole diameter is between 60 mm and 300 mm (2.36 and 11.81 in).

Nokia MetroHub can be installed in a vertical or horizontal position.

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Note

The horizontal installation is done in the same manner as wall mounting.

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A mounting rack is used in both wall and pole installations to provide a fixing base for Nokia MetroHub.

Screw holes and dimensions of the mounting rack are presented in the following figure. Screw holes R1, R2, R3, R4, R5 and R6 are for fixing the mounting rack onto the wall or onto the pole bracket. The upper MetroHub fixing screws are inserted into screw holes B1 and B2.

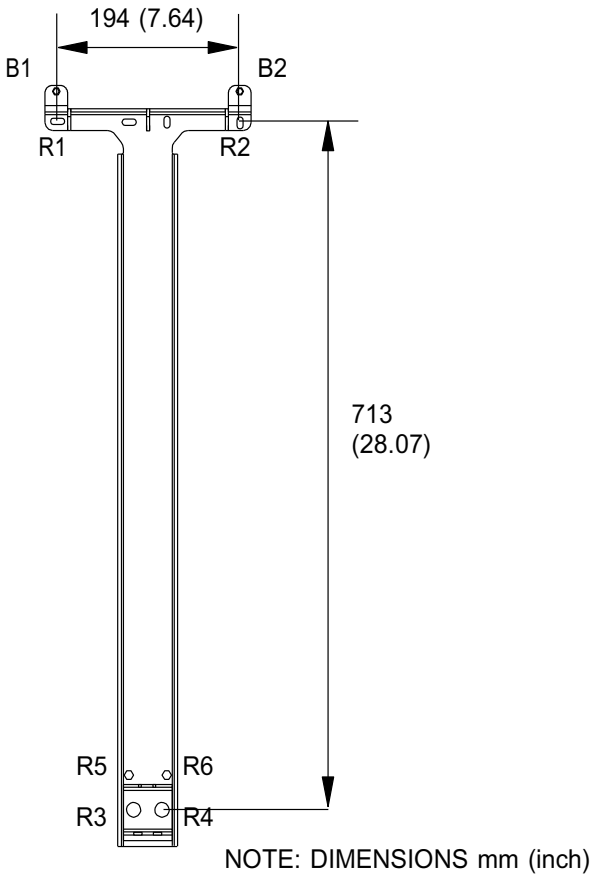
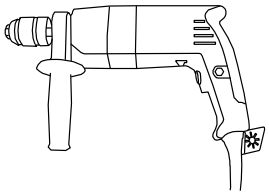



Figure 6. Mounting rack dimensions and screw holes

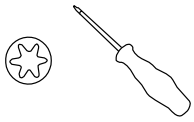
## 2.9 Tools requirements for Nokia MetroHub

This section specifies the equipment that is recommended for the installation of Nokia MetroHub, but not included in the MetroHub delivery:



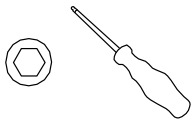
Drilling machine

-for drilling the fixing holes to the wall



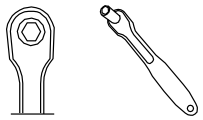
Torx driver T10

-for unit retaining screws



Ball ended Allen driver

-4 mm for MetroHub fixing screws



Torque socket spanner

with 8 mm hexagon socket for:
-worm screw on pole bracket version 2
-75 Ω FXC E1 unit connector (Rx)
grounding

Side-cutting pliers

-for cutting the cable ties
-for cutting the metal band of
pole bracket

Figure 7. Recommended installation equipment

In addition to the equipment shown in the figure above, also the following tools are needed:

- LMP-cable for connecting the manager-PC to MetroHub
- antistatic wrist strap
- spirit level for checking the horizontal level of MetroHub
- cable ties for routing the cables
- screwdriver with 2-2.5 mm flat head for DIPx cable connections (AC input and DC outputs)
- peeling tool

- crimping tools for different cable connector types, for example, Anderson Power-pole F-style, 1351G2 for the external DC input
- 10 mm spanner for removing the grounding bridge on a transmission unit (optional)
- 13 mm spanner for the grounding conductor
- knife
- tape measure
- appropriate lifting equipment (depending on the circumstances on the site)
- ladder (depending on the circumstances on the site)

Note

A set of tools needed in the assembling of cable connectors is available from Nokia.

## 2.10 Torque settings of Nokia MetroHub

A list of the different screws in Nokia MetroHub and the torque needed for tightening them is provided below.

Table 5. Screw sizes and torque

| Screw size | Head type | Purpose | Torque Nm/ft-lb |
|---|---|---|---|
| M3 | Torx head | Unit fixing<br>Fixing DIPx cover | 1 / .74 |
| M5 | 4 mm Allen head | Fixing battery to chassis<br>Fixing cable cover support to back wall | 2 / 1.5 |

Table 5. Screw sizes and torque (cont.)

| Screw size | Head type | Purpose | Torque Nm/ft-lb |
|---|---|---|---|
| M6 | 4 mm Allen head | Fixing cabinet to mounting rack | 5.5 / 4.06 |
| | | Fixing mounting rack to pole bracket | 10 / 7.37 |
| M8 | 13 mm hexagon head | Grounding screw | 4 / 3 |
| | 6 mm Allen head | Fixing L-beam offset screws | 12 / 8.85 |
| | | Fixing pole bracket blocks | 12 / 8.85 |

## 2.11 Overview of power requirements for Nokia MetroHub

To ensure safe installation conditions for both personnel and equipment, the grounding cabling should be planned and installed according to the *grounding (earthing) requirements for Nokia MetroHub*.

The power consumption of MetroHub depends on the amount and type of installed units, as well as the power feed to external devices such as microwave radio units and other equipment connected to the DC outputs of MetroHub, for example, LTE and modems. Refer to the following for details:

- *Power requirements for Nokia MetroHub*
- *Power requirements for the FXC E1 and FXC E1/T1 transmission units*
- *Power requirements for the FXC RRI transmission unit*
- *Power requirements for FXC STM-1 and FXC Bridge transmission units*

# 2.12 Grounding (earthing) requirements for Nokia MetroHub

To ensure safe installation conditions for both personnel and equipment, the grounding cabling is planned and installed before the installation of MetroHub. The purpose of protective grounding is to keep the potential of the equipment at the same level as the potential of the surrounding ground, and thus to protect MetroHub from damaging overvoltages through radio equipment, communication cables or power supply lines. To avoid interference, it is recommended that large grounding systems be designed case-specifically.

**Warning**

**MAINS VOLTAGE! Follow the national legislation when working with the power supply. All power and grounding cabling must meet the requirements of the local and national safety regulations.**

**Warning**

**To guarantee the safety of service personnel and other users of the telecommunications network, additional protective grounding is always required as stated in EN 60950, 'Safety of information technology equipment, including electrical business equipment' and UL 1950 3rd edition.**

To ensure the operation of the equipment, all equipment of an equipment station must be connected to the same ground potential.

Special care must be taken when grounding the cable sheaths so that the water and moisture seals at the connection points are reliable.

Ground connection via a power cord is not sufficient alone for Nokia MetroHub. Grounding must have a fixed, non-removable connection. Grounding is planned as presented in the following:

- The grounding cable is connected to the grounding terminal of MetroHub.
- The minimum and recommended cross-section of the copper grounding conductor is 16 $mm^2$/AWG 6 in outdoor installations.
- The maximum cross-section of the copper grounding conductor can be 25 $mm^2$/AWG 4.

- The grounding conductor is recommended to be a solid conductor or multiconductor cable. If a fine-wired cable is used, a sleeve is required on it.
- Target value of the site ground resistance between the cabinet and the soil is less than 10 Ω.
- The routing of the grounding cable should be as direct as possible. Avoid creating unnecessary loops.
- For roof-top grounding a copper cable of $\geq 25$ $mm^2$ is used. The grounding conductor is usually installed as a ring, when used for lightning protection.
- At rooftop sites, all exposed metal work, cable trays, antenna mounting structures, radio outdoor units, IU-OU cable grounding and the site earthing busbar (SEB) are connected to the building's lightning protection.

The main grounding conductor is installed to the bolt-type grounding terminal on the cable holder on the side of the battery tray.

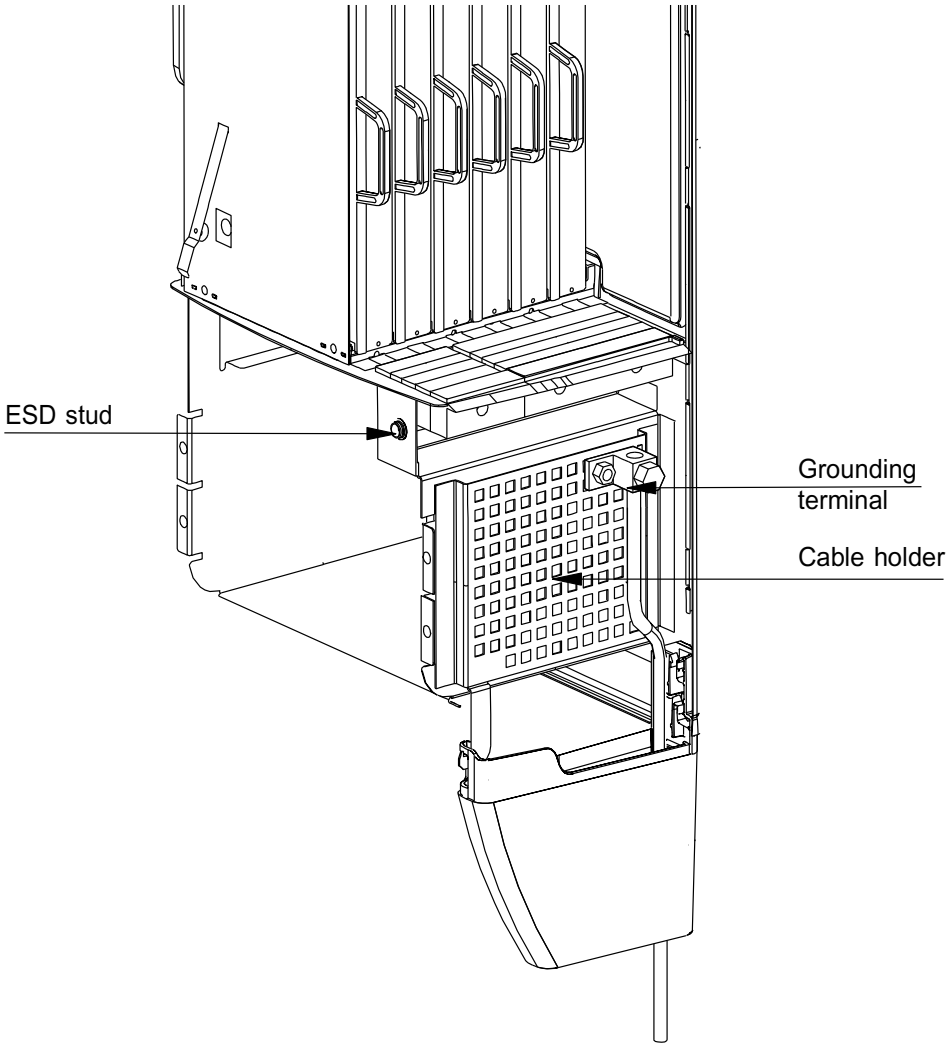



Figure 8. Grounding point

The overall grounding system is shown in the figure below.

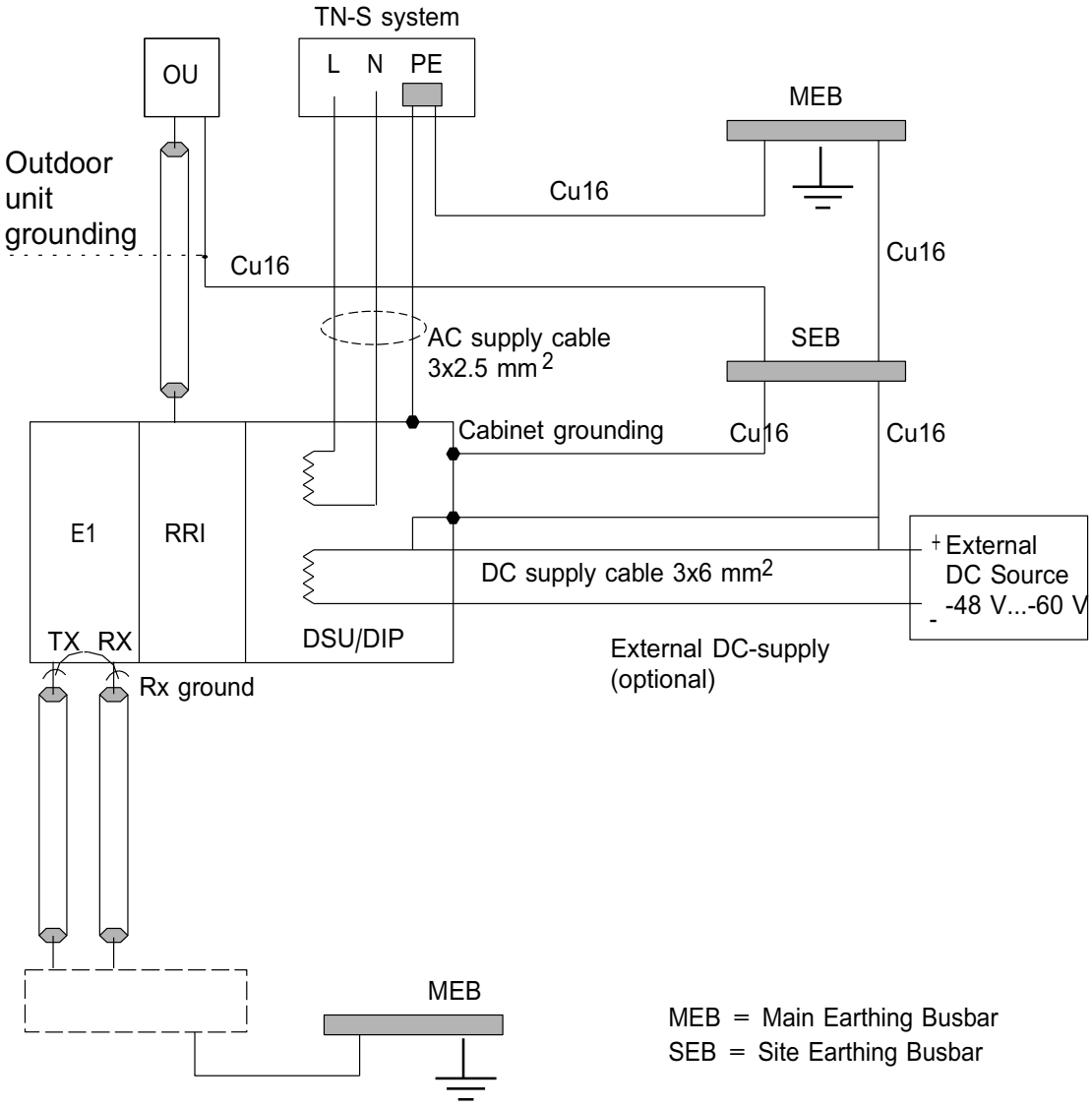



Figure 9. Example of site grounding

# 3 Installing Nokia MetroHub

## 3.1 Overview of installing Nokia MetroHub

**Before you start**

**Warning**

**MAINS VOLTAGE! Follow the national legislation when working with the power supply. All power and grounding cabling must meet the requirements of the local and national safety regulations.**

**Warning**

**Nokia MetroHub must be permanently wired to a disconnecting device (e.g. circuit breaker) in accordance with current local and national regulations. The power switch of the power supply unit of Nokia MetroHub does not disconnect it from the power network (AC and/or DC) but leaves it in the stand-by mode. The switch in the power supply unit has two positions: ON and STAND-BY.**

**Warning**

**Always make sure that voltage is switched off before starting the installation. There is a risk of electric shock and hazardous energy level under the cover of the power interface panel (DIPx). The cover of DIPx may only be opened by authorised personnel.**

**Warning**

**The use of incorrect AC polarity can cause a hazard. Follow the polarity markings on the AC connector under DIPx cover.**

**Warning**

**To guarantee the satefy of service personnel and other users of the telecommunications network, additional protective grounding is always required as stated in EN 60950, "Safety of information technology equipment, including electrical business equipment" and UL 1950 3rd edition.**

**Warning**

**Ensure that the cabinet main ground connection (the connector is located in the metal net of the battery tray) is established before the power inlet is connected to the power interface panel (DIPx). All ground connections must be secure and non-removable.**

**Warning**

**The following warning applies to the AC power supply: the protective ground wire can only be used for protective conductor installations. Using the protective ground conductor for other purpose is dangerous to life.**

**Warning**

**The external DC source must be grounded positive in the source. A negative-grounded system cannot be used.**

**Warning**

**The primary and secondary circuits of the external DC source must be separated by reinforced insulation, because the DC input and DC outputs of MetroHub are not isolated.**

### Warning

**If the optional battery unit is used, switching off the AC does not switch off MetroHub.**

### Warning

**Do not handle the battery cable carelessly or open plastic parts of the battery unit. There is a hazardous energy level present even if the battery is disconnected from the power interface panel (DIPx).**

### Caution

Installation, commissioning and maintenance measures concerning Nokia MetroHub Transmission Node may be performed only by properly trained and authorised personnel.

### Note

UL recognised power cables are required for installations complying with UL 1950.

### Note

IT power systems require permanent connection. When Nokia MetroHub is connected to an IT power system, the leakage current exceeds 3.5 mA.

The work must be thoroughly planned in advance.

The installation phase requires that the installation site has been properly surveyed and prepared, and that the installation of the necessary external services (ensuring the MetroHub can be installed without extra preparatory work) is complete.

The survey should also have identified any special requirements for the installation (for example, lifting equipment). These requirements should be provided at the start of the installation phase.

---

## Note

Familiarise yourself thoroughly with the warnings, cautions, and notes as well as the installation instructions before starting to install the equipment and to connect cables.

---

The suggested working order for the installation of the Nokia MetroHub Transmission Node is as follows:

**Steps**

1. **Unpack and inspect the Nokia MetroHub delivery.**

2. **Remove units from the Nokia MetroHub cabinet to enable installation, if necessary.**

3. **Mount the cabinet.**

   Mount the cabinet on

   - *the wall*
     a. *Attach the mounting rack to the wall.*
     b. *Attach the cabinet to the mounting rack.*
   - *the pole*
     a. Assemble the mounting brackets *with pole mounting kit version 1* or *with pole mounting kit version 2*.
     b. *Attach the pole brackets and mounting rack to the pole.*
     c. *Attach the cabinet to the mounting rack.*

4. **Connect the main grounding conductor to Nokia MetroHub.**

5. **Reinstall the removed units, if applicable.**

6. **Install an optional battery unit (DBBx) in Nokia MetroHub if it is included in the configuration.**

7. **Route the cables.**

8. **Connect the cables.**

   - *Connect power cables to Nokia MetroHub*.
   - *Connect interface cables to the interface unit (DIUx)*.
   - Connect the transmission unit cables.
     - *FXC E1*.
     - *FXC E1/T1*.
     - *FXC RRI*.
     - *FXC STM*.
   - *Connect the communication cable*.
   - *Mount the cable cover*.

9. **Power-up MetroHub.**

10. **Complete the installation.**

### Further information

After the hardware installation has been completed, the software can be installed as instructed in *Installing transmission node software from Nokia SiteWizard*. The software installation in turn enables the commissioning process, see *Overview of preparing for commissioning*.

## 3.2 Overview of preparing to install Nokia MetroHub

### Purpose

The suggested working order for preparing to install Nokia MetroHub is as follows.

### Steps

1. **Use the Site preparation checklist for Nokia MetroHub.**

2. **Unpack and inspect the Nokia MetroHub delivery.**

3. **Remove the cabinet cover.**

4. **Remove units from the Nokia MetroHub cabinet to enable installation.**

## 3.3 Site preparation checklist for Nokia MetroHub

**Steps**

1. **Check the site layout against the site drawings, and record any differences. See Space requirements for Nokia MetroHub and Operating conditions for Nokia MetroHub.**

2. **Check that the cable routes will allow for the installation of Nokia MetroHub.**

3. **Ensure that the equipment room has the necessary ventilation (indoor installations). See Space requirements for Nokia MetroHub and Operating conditions for Nokia MetroHub.**

4. **Ensure that the necessary external connections are available. See Overview of power requirements for Nokia MetroHub.**

5. **Ensure that the installation site is secure and accessible.**

6. **Calculate the space requirements. See Space requirements for Nokia MetroHub**

7. **Ensure that installation tools are available. See Tools requirements for Nokia MetroHub.**

8. **Install adequate lighting (if appropriate).**

9. **Prepare feeder and power cables.**

10. **Ensure that the walls and floors are painted or covered.**

11. **Ensure that the mounting method (wall/pole) meets the requirements. See Pole/wall requirements for the cabinet and Nokia MetroHub dimensions and weight.**

12. **Store Nokia MetroHub in the delivery package until the site construction work is complete and the site is clean and dry. See Storage conditions for Nokia MetroHub.**

13. **Ensure that all required installation documentation is available on site.**

## 3.4 Unpacking and inspecting the Nokia MetroHub delivery

**Before you start**

**Warning**

**The fully equipped MetroHub weighs 45 kg (99.1 lb), or without a battery unit, 32 kg (70.5 lb). Lifting the equipment requires at least two persons.**

Caution

In case of rain or snow, the installation space must be weather-guarded.

**Steps**

1. **Open the transportation package by removing the plastic wrapping around it.**

Note

Open the package in horizontal position.

Note

Do not destroy or discard the packing cardboard as it can be used as a template for defining clearances around MetroHub and for marking drilling holes for wall installation.

**2. Lift the equipment out of the package.**

Caution

Do not place the equipment in vertical position, when removing it from the package. Place it horizontally on the packing material.

**3. Check the completeness of the delivery and inspect the MetroHub surface visually for any defects.**

**Further information**

For delivery contents, see *Delivery content of Nokia MetroHub transportation package*.

**4. Open the lock at the bottom of MetroHub and remove the MetroHub cover.**

Caution

When the lock is opened, the key remains in the lock. Make sure you do not damage the key when handling MetroHub.

You can also remove the key by turning the lock into locked position. In this case you must turn the lock in the open position when reinstalling the cover.

5. Remove the mounting rack from the back of the cabinet.

**Steps**

**a. Loosen the offset screws on the L-beam.**

MetroHub becomes detached from the mounting rack.

**b. Loosen the upper screws holding MetroHub on the mounting rack.**

**c. Let both the offset screws and the upper screws remain engaged in their threads as they will later be used for cabinet installation.**

**6. Remove the wooden spacer blocks attached to the mounting rack.**

**7. Visually inspect the MetroHub interior for any defects.**

## 3.5 Removing the cabinet cover

**Purpose**

To perform internal maintenance of the cabinet, you must remove the cabinet cover.

**Before you start**

Before removing the cabinet cover, the following environmental restrictions must be considered:

- Do not let rain or snow fall on the internal surfaces of the equipment. The internal surfaces are the front panels, cables and connectors.
- Do not remove the cabinet cover in environments where dust can be blown into the cabinet.

---

Note

Removing the cabinet cover triggers an alarm in the manager, and the DIUx and master FXC unit LEDs switch to yellow.

---

**Steps**

**1. Unlock the cabinet.**

Use the key to unlock the cabinet. The cabinet lock is at the bottom of the cabinet.

2. **Push the cabinet cover and lift until the locking guides are free.**

   Push the cabinet cover from both sides and lift until the locking guides at the side of the cover come out from the locking recesses.

3. **Remove the cabinet cover.**

4. **Place the cabinet cover on the floor or hang it on the cabinet hook.**

   Place the cabinet cover on the floor or hang it on the hook at the side of the cabinet. Use the safety strap to secure the cover to the hook.

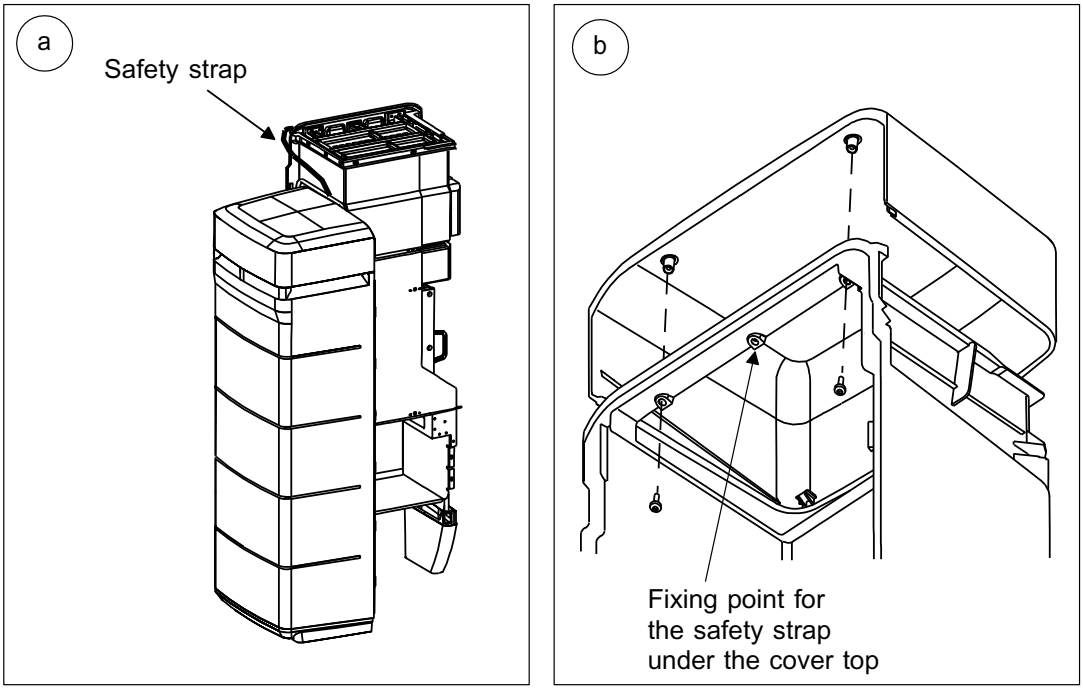



Figure 10. Safety strap

**Expected outcome**

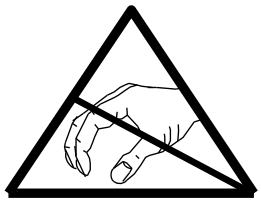
The cabinet cover is removed successfully.

# 3.6 Removing units from the Nokia MetroHub cabinet to enable installation

**Purpose**

In some installation cases, a sufficient number of units may have to be removed from the horizontally lying cabinet to make MetroHub easier to handle. The power supply units are the heaviest units so it may be sufficient to remove just them.

**Before you start**



NOTE
Use an antistatic wrist strap when handling electrostatic sensitive devices.

Caution

Handle the units with care. Do not place the removed units so that their connectors face the ground. Cover the removed units with the packing material.

**Summary**

The figure below shows the unit positions inside Nokia MetroHub.

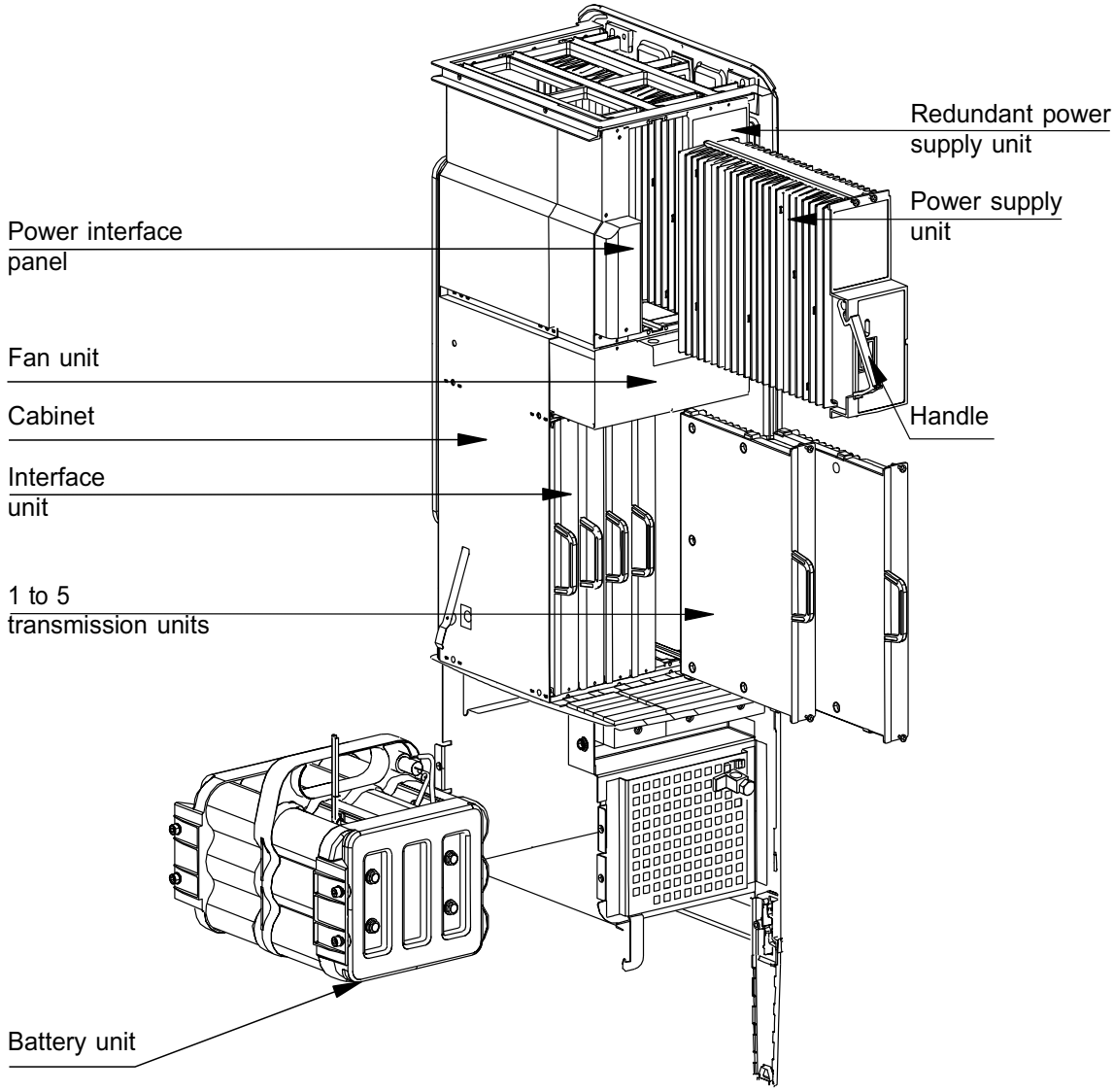



Figure 11. Arrangement of units

**Steps**

**1. Open the upper and lower retaining screws of the unit.**

Use T10 Torx driver.

**2. Remove the units with care by using the provided handle.**

# 4 Mounting Nokia MetroHub option 1

## 4.1 Overview of wall mounting the cabinet

**Before you start**

Note

The anchor screws must be M6 size, stainless steel screws with the minimum tensile strength ($R_m$) of 800N/mm$^2$.

Note

The packing cardboard provides a template for drilling the screw holes on the wall.

Note

If you use anchor screws with an external thread, ensure that the protrusion of the screw head from the wall does not exceed 30 mm (1.18 in) (upper anchor screws) and 25 (0.98 in) (lower anchor screws) when the screw is fully tightened.

**Steps**

1. **Attach the mounting rack to the wall.**
2. **Attach the cabinet to the mounting rack.**

## 4.2 Attaching the mounting rack to the wall

**Steps**

**1. Define clearances required around the cabinet.**

Cut the template out of the packing cardboard by following the dotted line which indicates the space required. See the following figure.

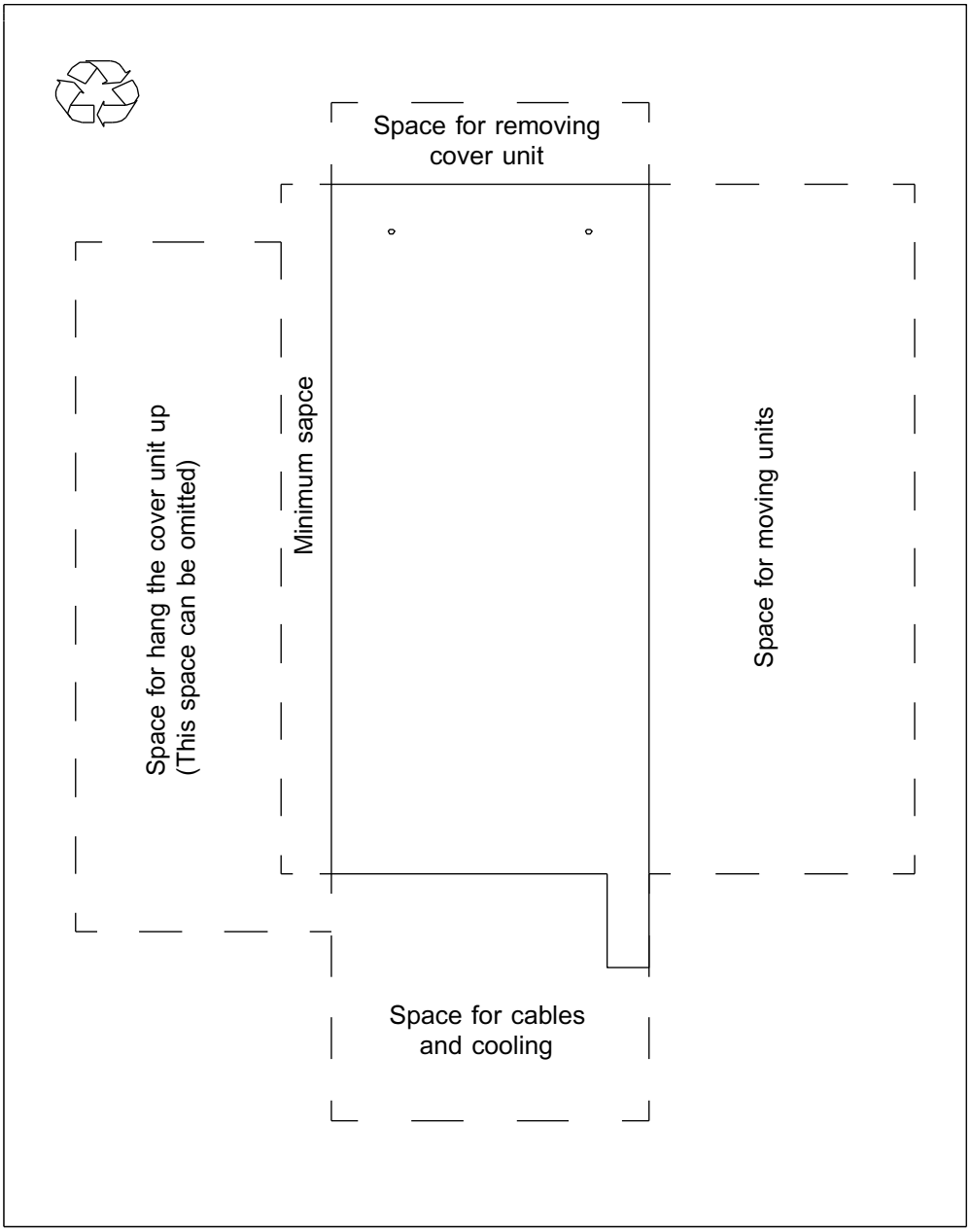



Figure 12. Cardboard template

**2. Find a wall area which is large enough to cover all parts of the template and position the packing cardboard on it.**

Use a spirit level to check that the template is in a straight position.

Note

In order to hang the cover on the side of the cabinet during installation and maintenance, a clearance of 250 mm (10 in) is required. This space can be omitted, as indicated on the template in figure *Wall mounting the cabinet*, if the cover can safely be placed elsewhere, for example, on the floor. In this case, only a clearance of 50 mm (2 in) is required, and the template can be cut along the 'minimum space' line.

3. **Mark the fixing points by hitting, for example, with a centre punch through the drilling hole marks on the template.**

4. **Drill the holes in the wall and clean them out.**

5. **Insert anchor plugs or another appropriate counterpart into the wall, depending on the wall material.**

6. **Position the mounting rack on the correct location on the wall and attach it by inserting appropriate anchor screws through the upper anchor screw holes.**

   See R1 and R2 in figure *Wall mounting the cabinet*.

   Use a spirit level to set the mounting rack straight and adjust with the help of the oval screw holes.

Note

In case the cabinet is to be installed side by side with a Nokia BTS, the cabinet mounting rack must be fixed 8 mm lower than the BTS mounting rack in order to have them at the same level.

7. **Drill screw holes for the lower anchor screws through the holes marked with R3 and R4 in the figure above.**

8. **Insert anchor plugs or another appropriate counterpart into the wall, depending on the wall material.**

9. **Position the washer on the larger screw holes on the lower part of the mounting rack.**

**10. Insert and tighten the screws.**

**Expected outcome**

The mounting rack has been installed to the wall.

## 4.3 Attaching the cabinet to the mounting rack

**Before you start**

Make sure that the mounting rack has been properly installed to the wall.

**Summary**

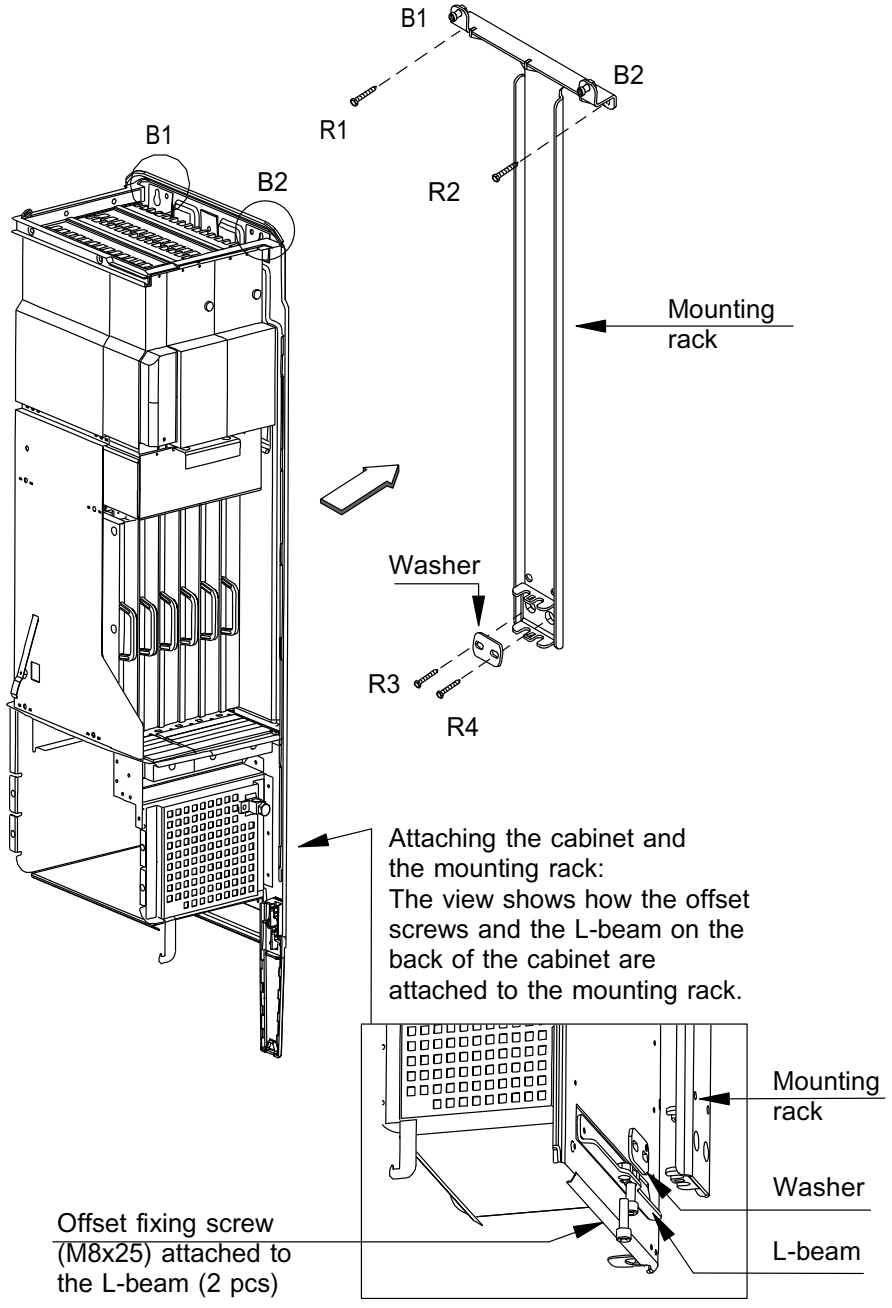



Figure 13. Wall mounting the cabinet

### Steps

1. **Hang the cabinet on the upper fixing screws (B1 and B2 in the figure above) which are already attached to the mounting rack.**

   Do not tighten them yet.

2. **Position the two offset screws which are attached to the L-beam (on the back of the cabinet) into the offset screw slots on the lower part of the mounting rack as shown in the small graphic in the figure above.**

3. **Tighten the upper cabinet fixing screws (B1 and B2 in the figure above) using a torque driver and a 4 mm Allen bit with a shaft of at least 60 mm in length.**

   Tighten the screws to 5.5 Nm (4.06 ft-lb).

4. **Tighten the offset screws on the L-beam from the underside to 12 Nm (8.85 lb/ft) using a torque socket spanner/wrench and a 6 mm Allen bit with an 80 mm extension.**

   Refer to the small graphic in the figure above which shows the rear view of the cabinet.

### Expected outcome

When you have installed the cabinet, proceed to unit installation and cabling.

# 5 Mounting Nokia MetroHub option 2

## 5.1 Overview of pole mounting the cabinet

**Purpose**

The work order for pole mounting the cabinet is as follows.

**Before you start**

---

Note

There are two versions of the pole mounting kit, version 1 and version 2. Follow the instructions that refer to your pole mounting kit.

---

**Steps**

1. **Either assemble the pole brackets with version 1 pole mounting kit, or assemble the pole brackets with version 2 pole mounting kit.**
2. **Attach the pole brackets and mounting rack to the pole.**
3. **Attach the cabinet to the mounting rack.**

## 5.2 Assembling the pole brackets with version 1 pole mounting kit

**Summary**

The mounting brackets (both upper and lower) consist of two blocks. The front block is attached to the mounting rack, and the back block clamps the front block to the pole.

The bracket blocks and their bolt holes are presented in the following figure.

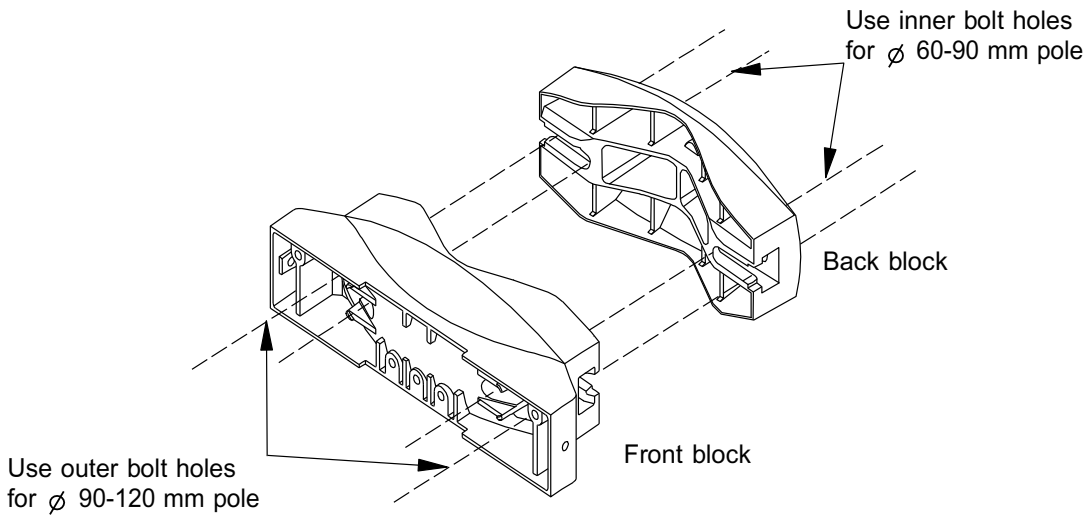



Figure 14. Blocks of the pole bracket

## Note

If the diameter of the installation pole is 60 - 90 mm (2.4 to 3.5 in), use the inner bolt holes. If the diameter of the installation pole is 90 - 120 mm (3.5 to 4.7 in), use the outer holes. Refer to 1 in the following figure.

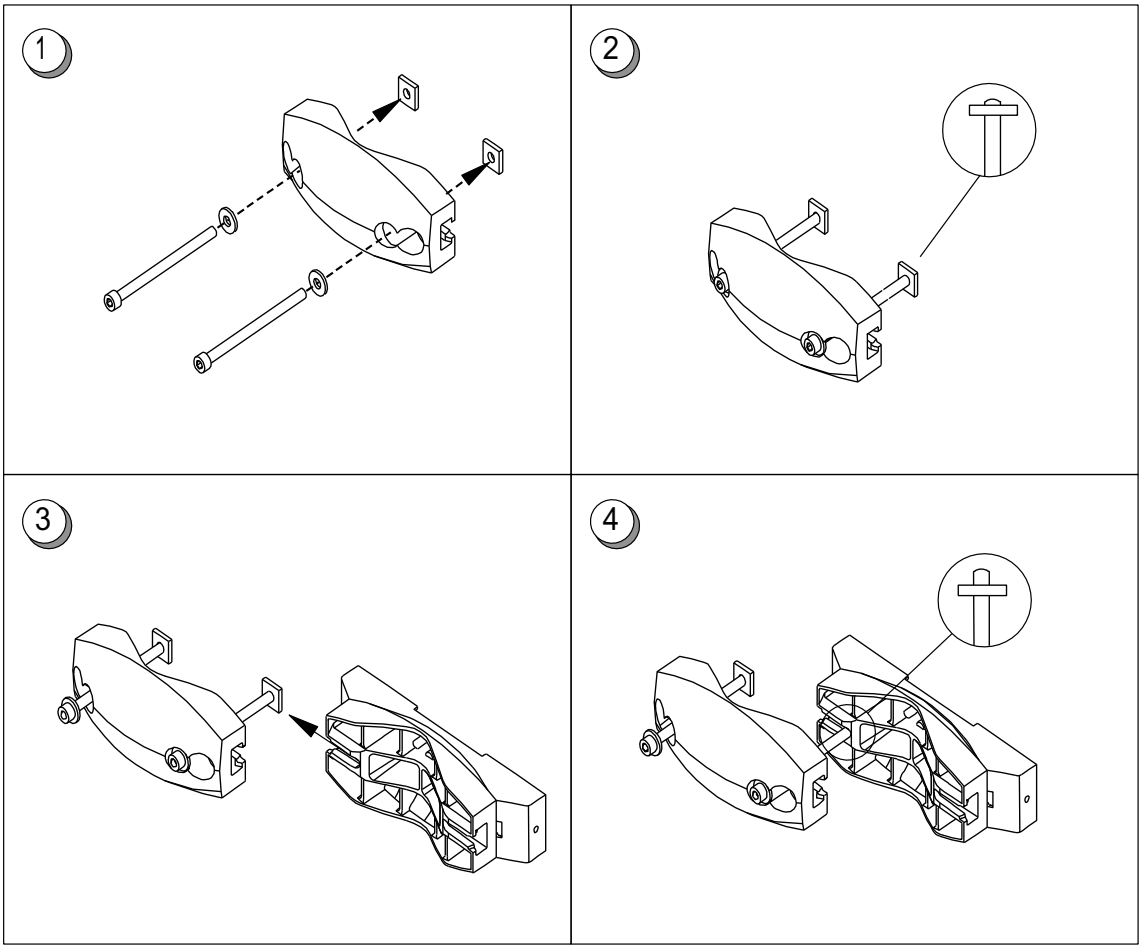



Figure 15. Preassembling the pole brackets

**Steps**

1. **Insert the assembly bolts with washers into the bolt holes in the back blocks.**

   **Further information**

   Refer to [1] in figure *Preassembling the pole brackets* above.

2. **Attach the square nuts to the ends of the bolts.**

   Screw the nuts just enough to prevent them from falling off from the ends of the bolts.

**Further information**

Refer to [2] in figure *Preassembling the pole brackets* above.

3. **Slide one bolt with the square nut to the slot at the side of the front block.**

**Further information**

Refer to [3] in figure *Preassembling the pole brackets* above.

4. **Screw the bolt on enough to prevent the bolt and the nut from sliding out from the side of the front block.**

**Further information**

Refer to [4] in figure *Preassembling the pole brackets* above.

## 5.3 Assembling the pole brackets with version 2 pole mounting kit

**Summary**

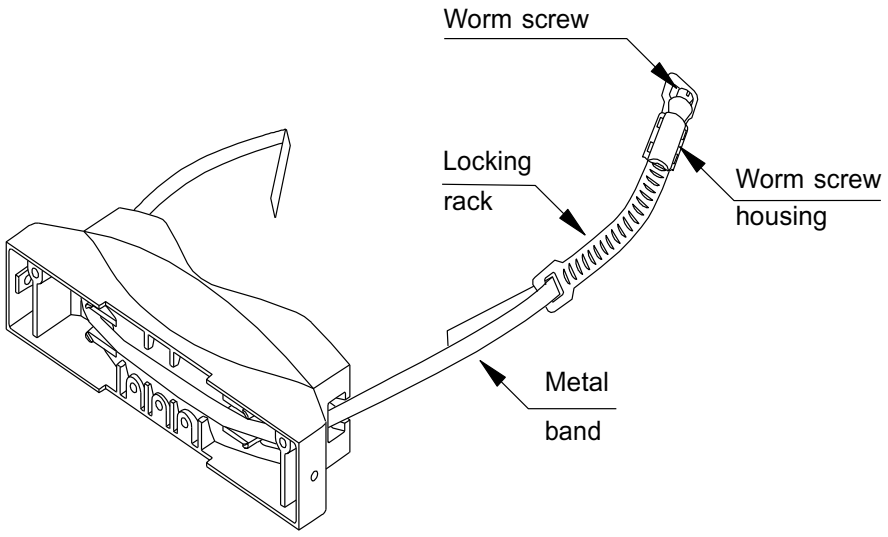



Figure 16. Pole bracket preassembled (pole mounting kit version 2)

**Steps**

1. **Assemble the locking device.**

   Insert the end of locking rack into the worm screw housing just enough to engage the rack. Make sure the words THIS SIDE UP on the rack are facing you.

2. **Cut the metal band with the side-cutting pliers to the appropriate length according to the pole diameter.**

   **Further information**

Table 6. Band length for different pole diameters

| Pole diameter (mm) | Band length (mm) | Pole diameter (in.) | Band length (in.) |
|---|---|---|---|
| 140 | 580 | 5.5 | 22.8 |
| 160 | 630 | 6.3 | 24.8 |
| 180 | 680 | 7.1 | 26.8 |
| 200 | 740 | 7.9 | 29.1 |
| 220 | 790 | 8.7 | 31.1 |
| 240 | 850 | 9.5 | 33.5 |
| 260 | 900 | 10.2 | 35.4 |
| 280 | 950 | 11.0 | 37.4 |
| 300 | 1010 | 11.8 | 39.8 |

3. **Route the metal band through the holes in the front block.**

4. **Bend one end of the metal band about 30 mm (1.2 in) towards the underside to form a hook.**

5. **Insert the hook to the slot at the end of the locking rack.**

6. **Bend the other end of the metal band about 30 mm (1.2 in) towards the underside to form a hook.**

   Leave it free for now.

# 5.4 Attaching the pole brackets and mounting rack to the pole

**Before you start**

Note

Before taking the mounting rack up on the pole, perform the tasks instructed in steps 1 and 2.

**Steps**

1. **To fix the upper pole bracket to the mounting rack, screw the M6x20 Allen screws through the holes R1 and R2 into the upper front block.**

   See the following figure that corresponds to the mounting kit version used.

   Make sure that the three adjacent screw holes are on the upper edge of the bracket. Use a torque driver with a 4 mm Allen bit to tighten to 5.5 Nm (4.06 ft-lb).

NOTE! Make sure that
the three adjacent screw holes
are on the upper edge
of the bracket block.

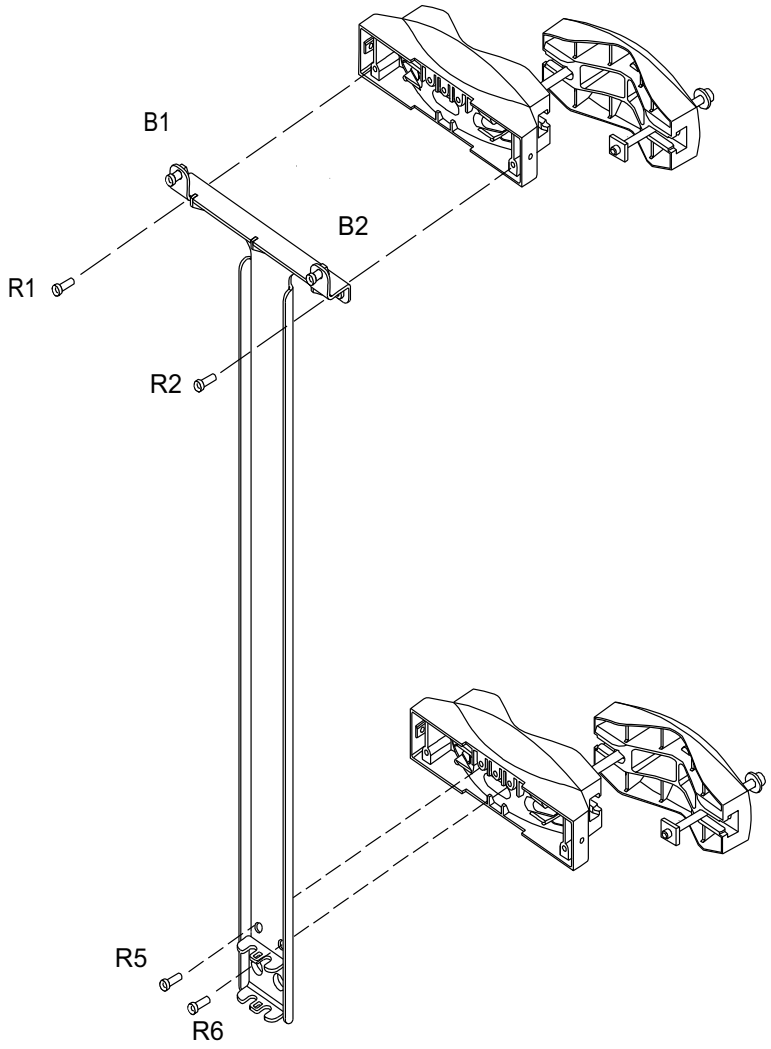



Figure 17. Attaching the mounting rack and the pole brackets with the pole mounting kit version 1

NOTE! Make sure that
the three adjacent screw holes
are on the upper edge
of the bracket block.

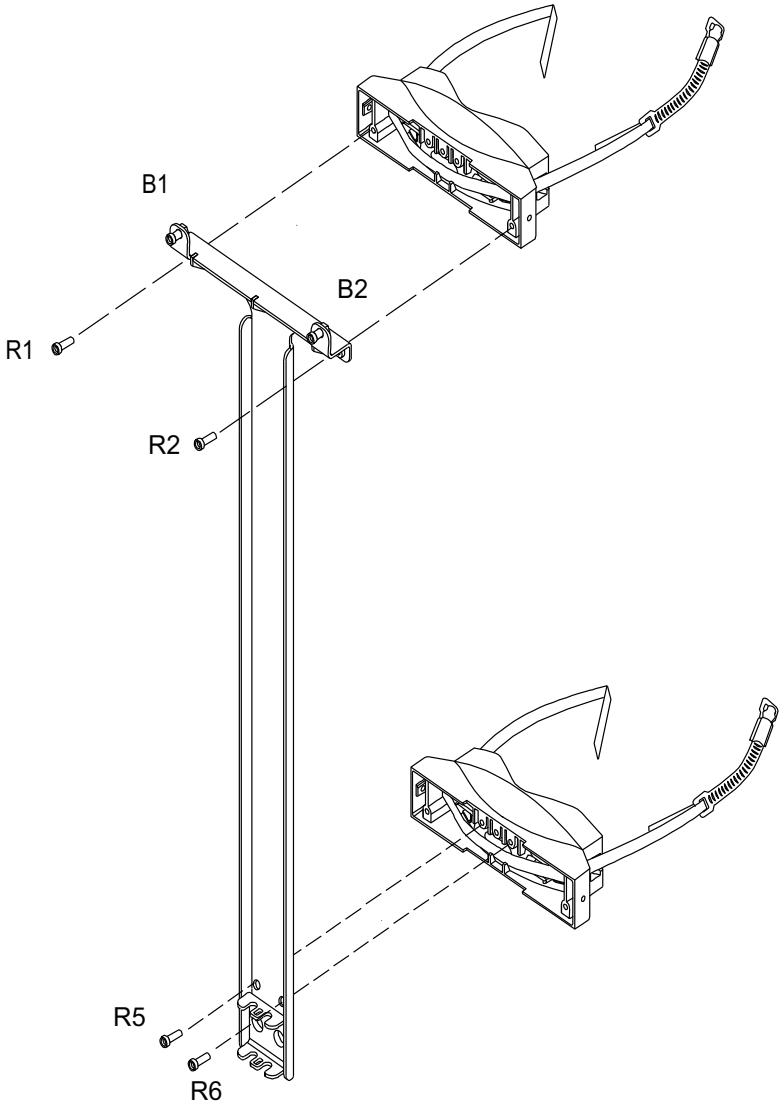



Figure 18. Attaching the mounting rack and the pole brackets with the pole mounting kit version 2

**2. To fix the lower pole bracket to the mounting rack, screw the M6x20 Allen screws through the holes R5 and R6 into the lower front block.**

See the figure above that corresponds to the mounting kit version used.

Make sure that the three adjacent screw holes are on the upper edge of the bracket. Use a torque driver with a 4 mm Allen bit to tighten to 5.5 Nm (4.06 ft-lb).

3. **Bring the mounting rack/pole bracket combination to the pole.**

4. If you are using the pole mounting kit version 1

**Steps**

   a. **Position the upper front block of the pole bracket on the pole and rotate the back block so that you can insert the free bolt with the square nut into the slot at the side of the front block.**

   b. **Tighten the bolts evenly to fix the upper pole bracket to the pole.**

      Use a torque socket spanner/wrench with a 6 mm Allen bit to tighten to 12 Nm (8.85 ft/lb).

5. If you are using the pole mounting kit version 2

**Steps**

   a. **Wrap the metal band of the upper bracket tightly around the pole.**

   b. **Insert the hook-shaped free end of the band into the band slot on the worm screw housing.**

   c. **Tighten the worm screw to 10 Nm (7.4 ft-lb) with a 8 mm hexagon socket.**

6. **Fix the lower bracket in the same manner as the upper bracket.**

## 5.5 Attaching the cabinet to the mounting rack

**Before you start**

The mounting racks and the pole brackets have been properly installed on the pole.

**Summary**

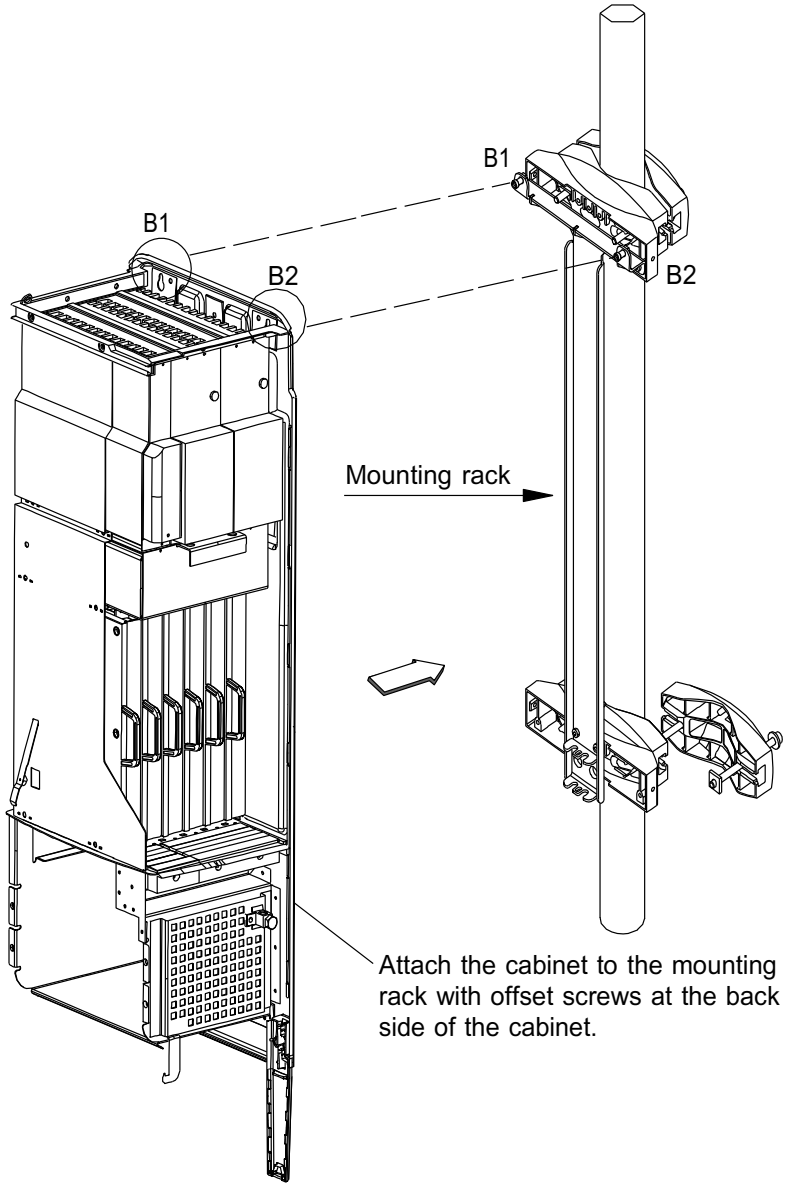



Figure 19. Pole mounting the cabinet (pole mounting kit version 1)

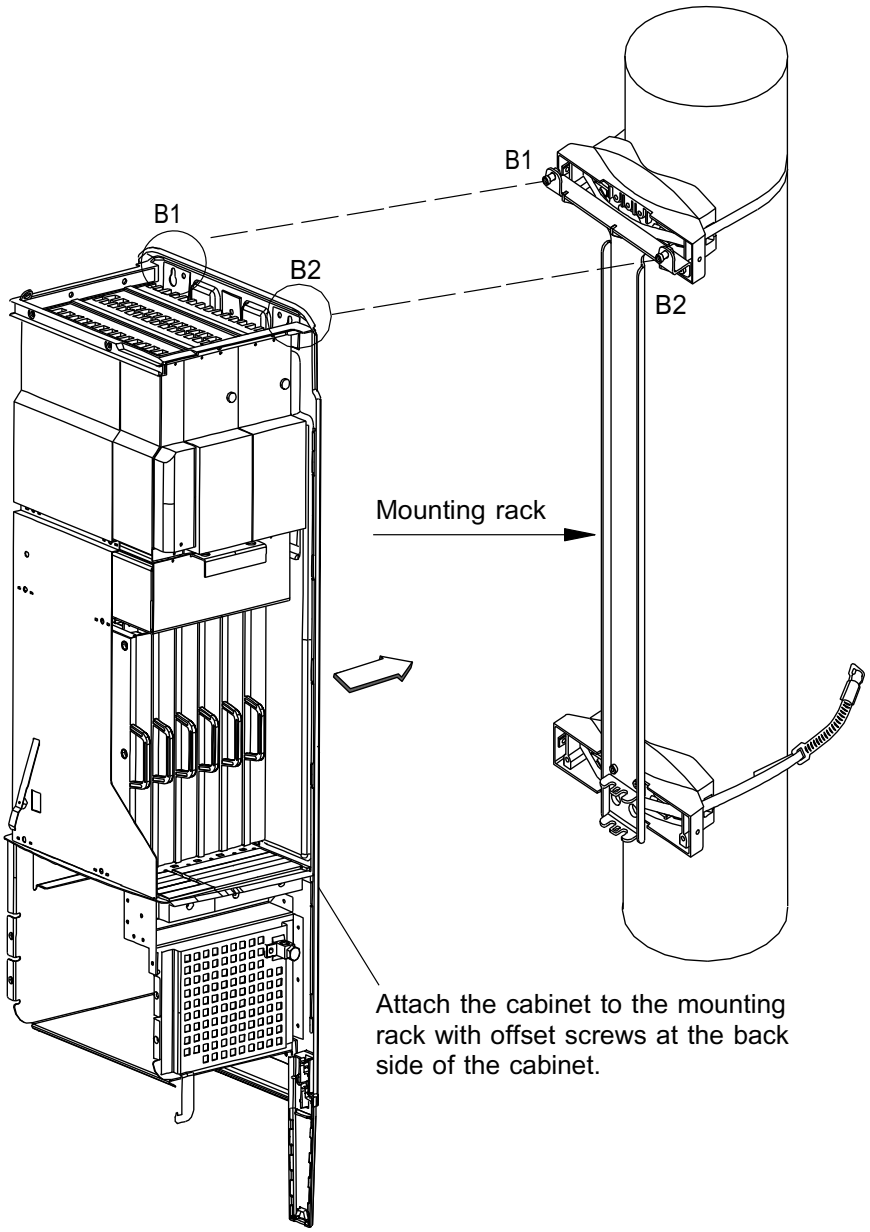



Figure 20. Pole mounting the cabinet (pole mounting kit version 2)

**Steps**

1. **Bring the cabinet to the mounting rack and hang it on the upper cabinet fixing screws (B1 and B2 in the figure above) which are already attached to the mounting rack.**

Do not tighten them yet.

2. **Position the offset screws which are attached to the L-beam (on the back of the cabinet) into the offset screw slots on the lower part of the mounting rack as shown in the figure above.**

3. **Tighten the upper cabinet fixing screws (B1 and B2 in the figure above) to 5.5 Nm (4.06 ft-lb) by using a torque driver with a 4 mm Allen bit.**

4. *If* you are using the pole mounting kit version 1

   *Then*

   **Tighten the offset screws on the L-beam from the underside. Use a torque socket spanner/wrench with a 6 mm Allen bit and an 80 mm extension to tighten to 12 Nm (8.85 ft/lb).**

5. *If* you are using the pole mounting kit version 2

   *Then*

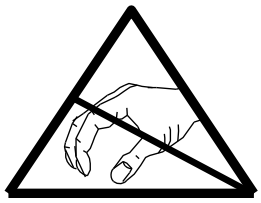
   **Tighten the offset screws on the L-beam from the underside.**

   Use a torque socket spanner/wrench with a 6 mm Allen bit to tighten to 12 Nm (8.85 ft-lb).

# 6 Installing the units of Nokia MetroHub

## 6.1 Overview of installing the units of Nokia MetroHub

**Before you start**



NOTE
Use an antistatic wrist strap when handling electrostatic sensitive devices.

**Steps**

1. **Make sure that the sealing on the back of the unit is in place.**
2. **Slide the unit into the appropriate slot.**

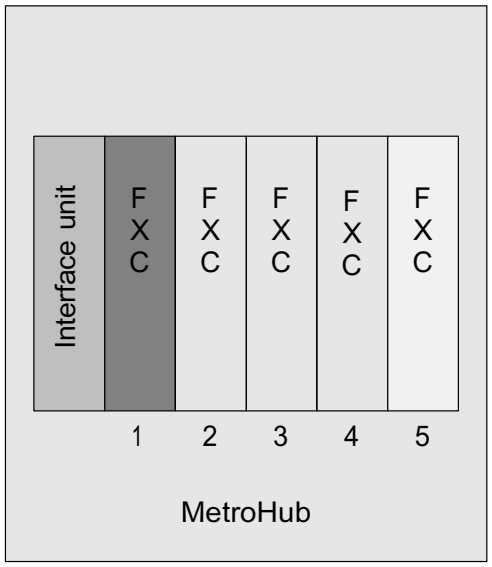



Figure 21. Transmission unit slots in Nokia MetroHub

Slide the unit into the appopriate slot. The units can be installed in any slot, with the exception of the following:

- Both FXC STM-1 and FXC Bridge must be installed for the intended SDH functionality. If there is no FXC Bridge present, the FXC STM-1 unit will be limited in operation.

  Install the FXC STM-1 and FXC Bridge units side by side, with the FXC Bridge unit on the left if possible.
- Do not install an FXC STM-1 unit in the first slot, as the FXC STM-1 does not support node master functionality. Also, it is not recommended to install the FXC STM-1 unit the last slot (slot 5).
- Do not install more than one FXC STM-1 unit, or more than one FXC Bridge unit.

**Further information**

See figure *Arrangement of units*.

**3. Press the unit carefully against the backplane.**

Do not use excessive force.

4. **Fix and tighten the unit retaining screws.**

   Use T10 Torx driver.

Note

In order to ensure weather shielding, all unit retaining screws must be tightened.

5. **Repeat the procedure for every unit.**

6. **Install the transmission unit logically with the manager**

## 6.2 Installing a power supply unit (DSUx) in Nokia MetroHub

### Before you start

It is recommended that

- the power supply unit is inserted in the left slot and the redundant power supply unit in the right slot.
- the DSUx stand-by switch is in stand-by position.

Note

The appearance of the power supply units may vary by the manufacturer. Power supply units in one MetroHub cabinet should be from the same manufacturer.

### Steps

1. **Install the units as described in Overview of installing the units of Nokia MetroHub.**

# 6.3 Installing an optional battery unit (DBBx) in Nokia MetroHub

**Before you start**

**Warning**

**If the optional battery unit is used, switching off the AC does not switch off Nokia MetroHub.**

Caution

Replace the battery unit only with the type recommended by Nokia. Dispose of the used battery unit by handing it in at a collection point. Never dispose of old batteries as domestic waste.

The battery cable must be routed and connected when the battery unit is installed.

**Summary**

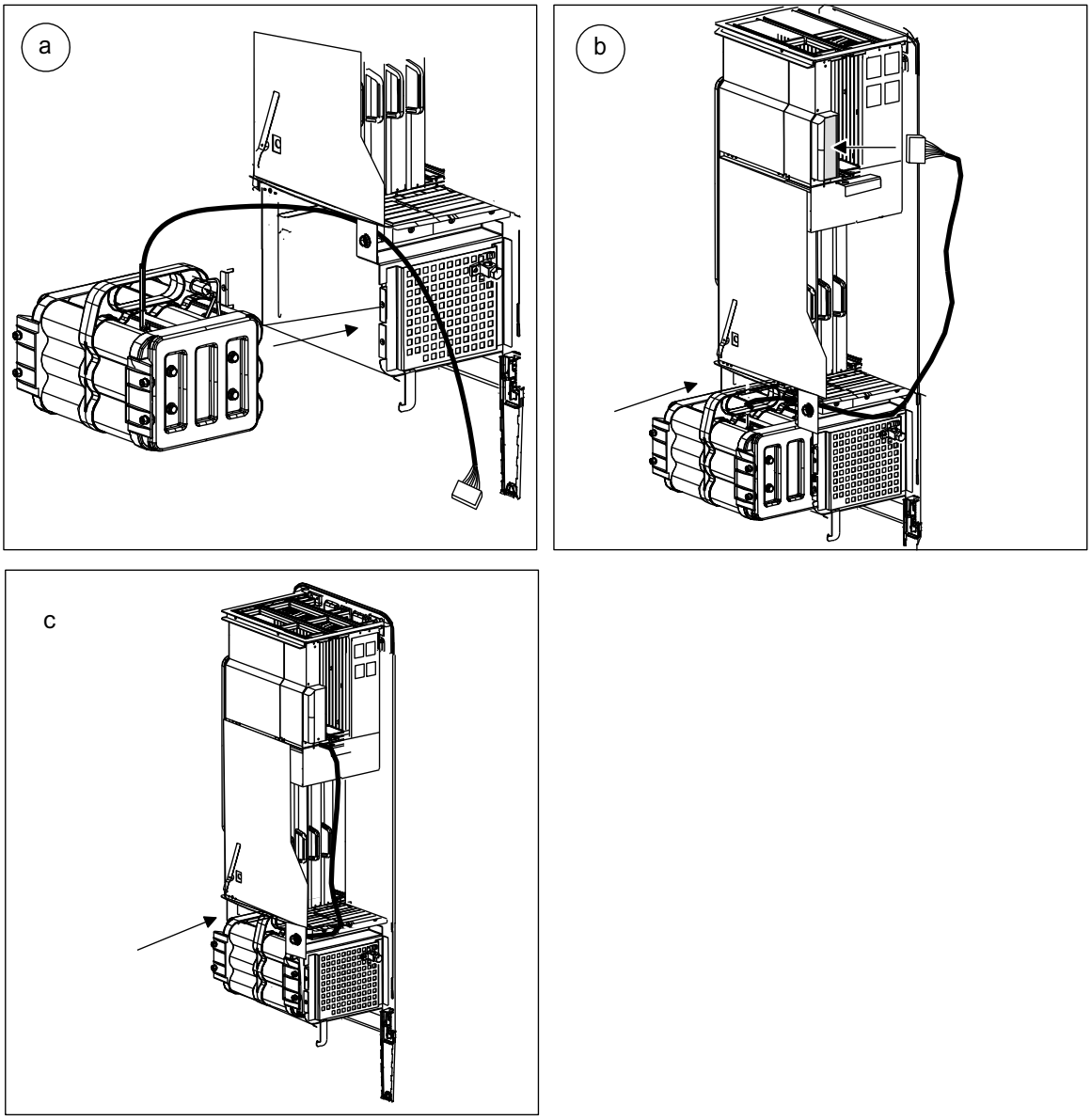



Figure 22. Battery pack installation

**Steps**

**1. Route the battery cable through its slot in the cable entry shield (see a).**

See Figure *Cable entry* for details of the cable entry shield.

2. **Lift the battery unit to the battery tray, and slide it part of the way inside (see b).**

3. **Connect the battery cable to the power supply interface (see b).**

4. **Straighten the cable so that any excess length is below the cable entry shield (see c).**

5. **Slide the battery unit fully into the battery tray (see c).**

6. **Fix and tighten the battery unit retaining screws.**

# 7 Cabling Nokia MetroHub

## 7.1 Overview of cabling Nokia MetroHub

**Purpose**

The suggested working order for cabling Nokia MetroHub is as follows.

**Steps**

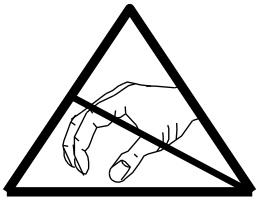
1. **Connect the antistatic wrist strap to Nokia MetroHub.**
2. **Connect the main grounding conductor to Nokia MetroHub.**
3. **Connect power cables to Nokia MetroHub.**

## 7.2 Connecting the antistatic wrist strap to Nokia MetroHub

**Purpose**

An electrostatic sensitive device (ESD) is an electronic component (e.g. semiconductor device or integrated circuit) that may be permanently damaged by electrostatic charges encountered in routine handling, testing and transportation. Before touching an assembly containing ESD, discharge to ground any electrostatic charges that may have accumulated, and remain discharged by using a grounding wrist strap.

Electrostractic sensitive devices are clearly labelled.



NOTE
Use an antistatic wrist strap when handling electrostatic sensitive devices.

Figure 23. The ESD label

**Steps**

**1. Find the grounding stud on the cabinet.**

Find the grounding stud on the cabinet. The position of the grounding stud is shown in the following diagram.

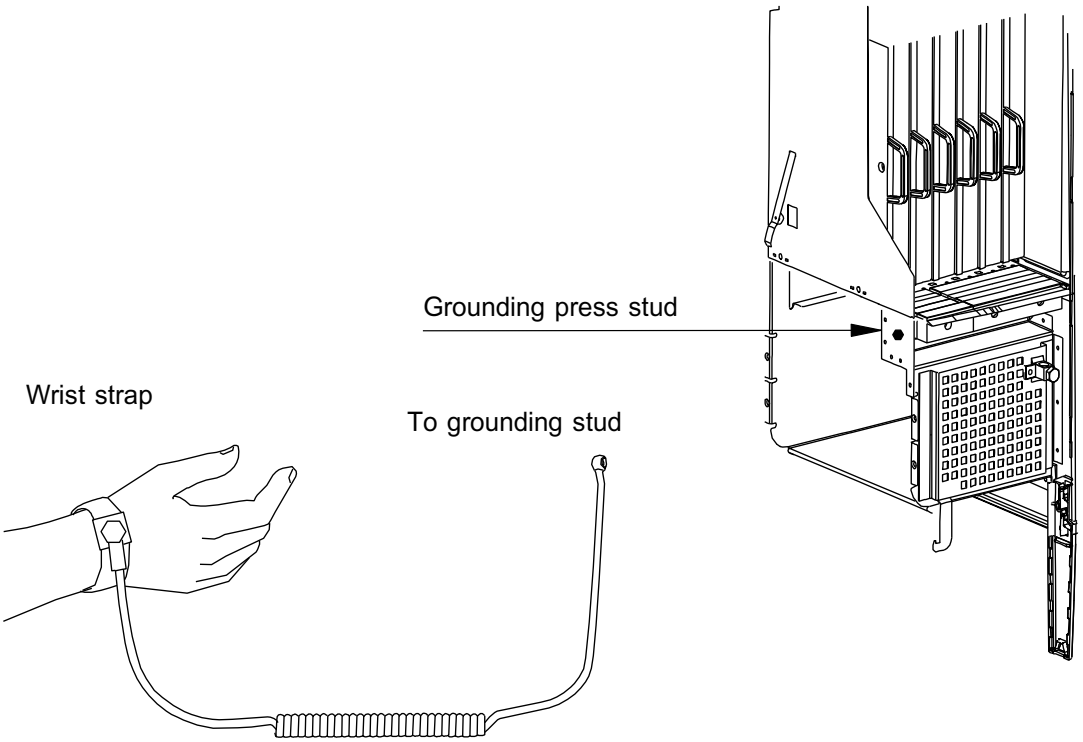



Figure 24. Connecting the antistatic wrist strap

**2. Discharge by touching the grounding stud.**

Touch the grounding stud with your bare hand. This will discharge to ground any electrostatic charges that may have accumulated.

**3. Attach the antistatic wrist strap to the grounding stud.**

---

Note

Wear the antistatic wrist strap around your bare wrist.

---

**Expected outcome**

The antistatic wrist strap is attached to the grounding stud.

# 7.3 Connecting the main grounding conductor to Nokia MetroHub

**Before you start**

**Warning**

**To guarantee the satefy of service personnel and other users of the telecommunications network, additional protective grounding is always required as stated in EN 60950, "Safety of information technology equipment, including electrical business equipment" and UL 1950 3rd edition.**

**Warning**

**Ensure that the cabinet main ground connection (the connector is located in the metal net of the battery tray) is established before the power inlet is connected to the power interface panel (DIPx). All ground connections must be secure and non-removable.**

**Warning**

**The following warning applies to the AC power supply: the protective ground wire can only be used for protective conductor installations. Using the protective ground conductor for other purpose is dangerous to life.**

The main grounding conductor is installed to the bolt-type grounding terminal on the cable holder on the side of the battery tray. See the following figure.

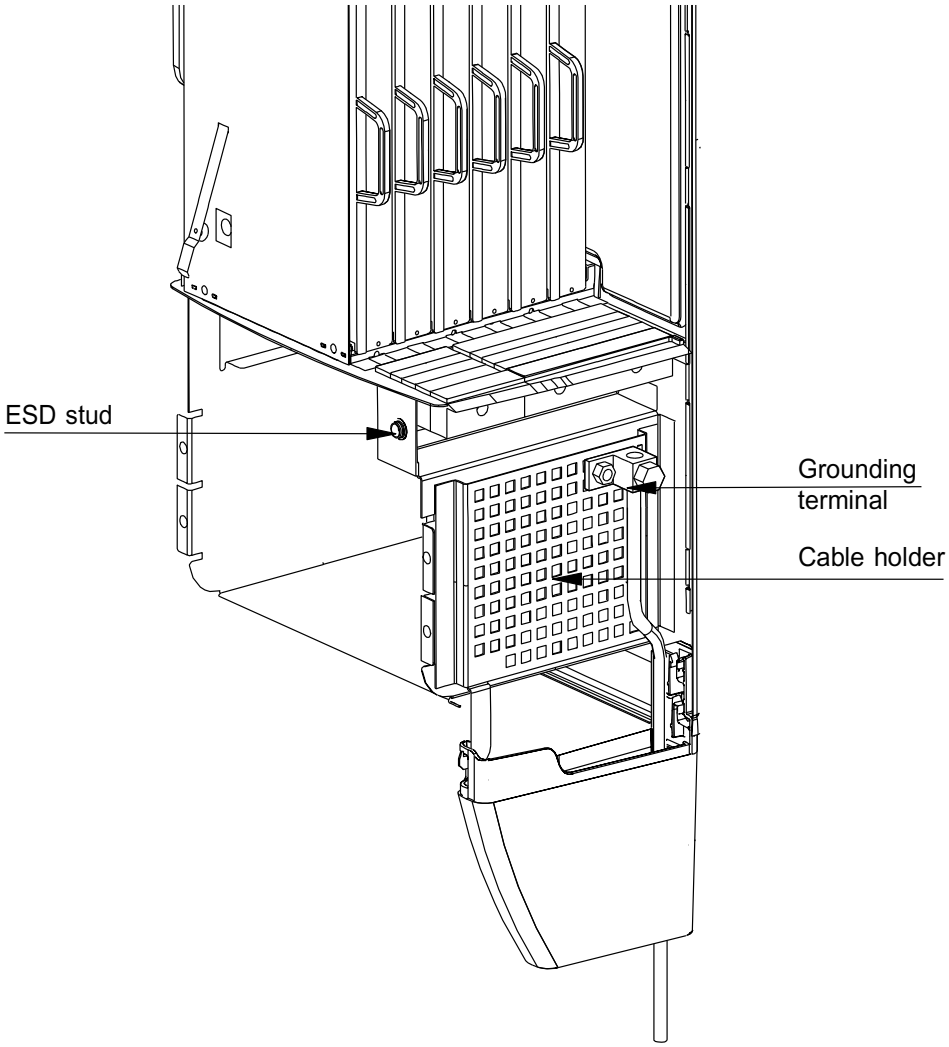



Figure 25. Grounding point

**Steps**

1. **Use at least a 16 mm$^2$/AWG 6 insulated stranded copper conductor.**

   The maximum cross-section of the wire can be 25 mm$^2$/AWG 4.

2. **Use an appropriate cable route to reach the cable terminal and avoid sharp bends.**

3. **Fasten the grounding conductor along the vertical route using cable ties.**

4. **Strip the conductor for 20 mm and screw it tightly using a 13 mm spanner.**

# 8 Connecting power cables

## 8.1 Overview of connecting power cables to Nokia MetroHub

**Purpose**

The power cables (the AC or DC input, −48 V DC output, +55 V DC output and the battery unit cables) are connected to the power interface panel (DIPx).

**Before you start**

**Warning**

**Read carefully Warnings and cautions before starting to connect the cables.**

The connectors on the unit front panels are covered with rubber caps. Remove the caps from those connectors that will be used for cabling.

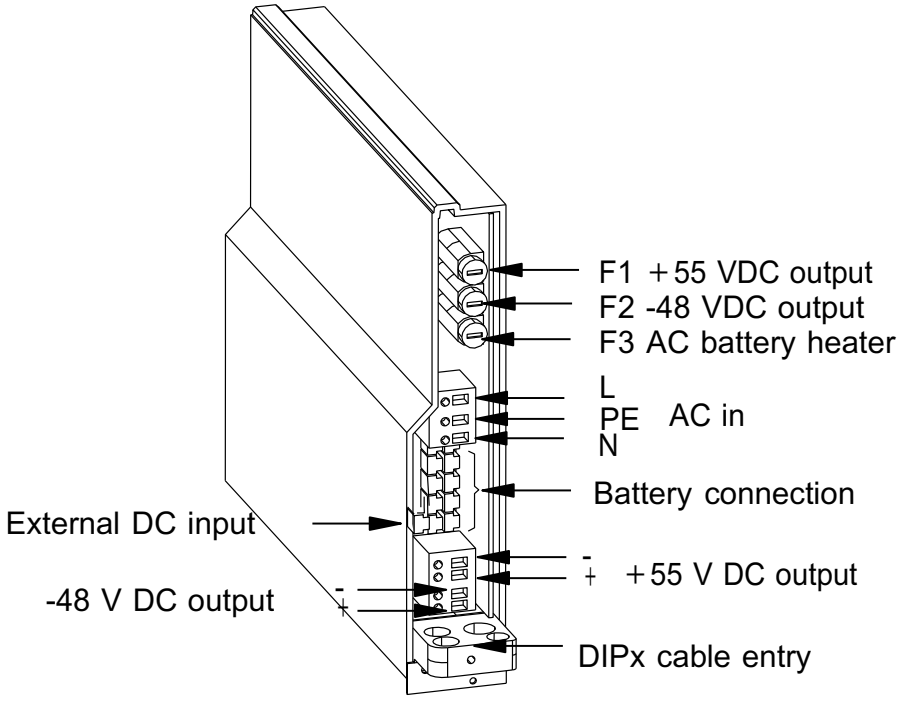



Figure 26. Power interface panel (DIPx)

---

Note

Leave enough slack in the cables to avoid strain and to be able to pull out the fan, if needed, without disconnecting the power cables.

---

Cut off the rubber tips of the cable entry sealing of the DIPx (see the two figures below) to make holes for the cables. Table *Diameters of the holes in the cable entry sealing* shows which hole is intended for which cable.

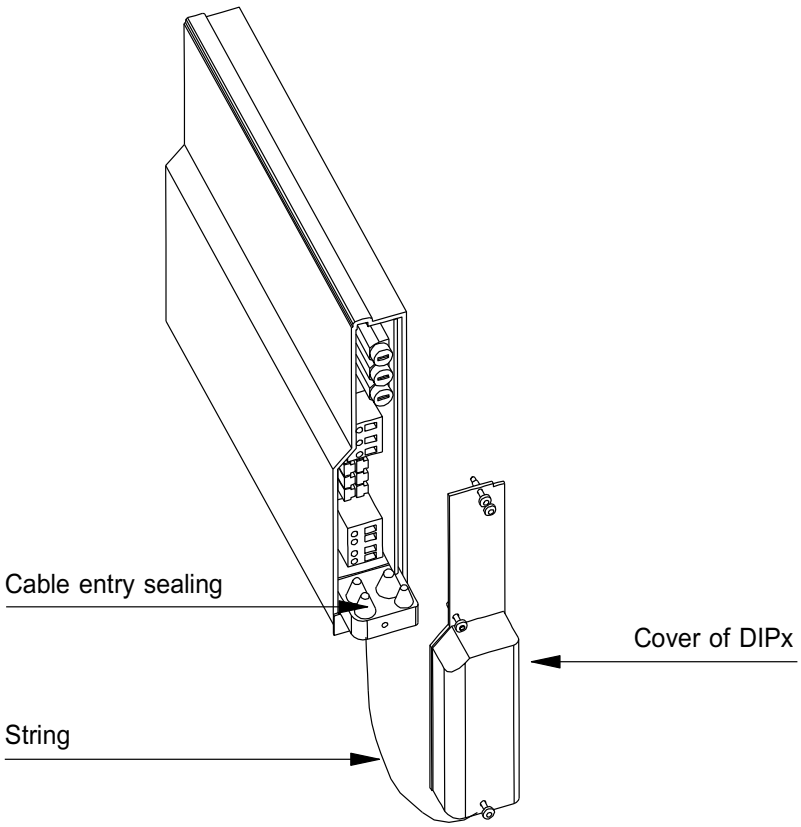



Figure 27. DIPx cable entry sealing and cover

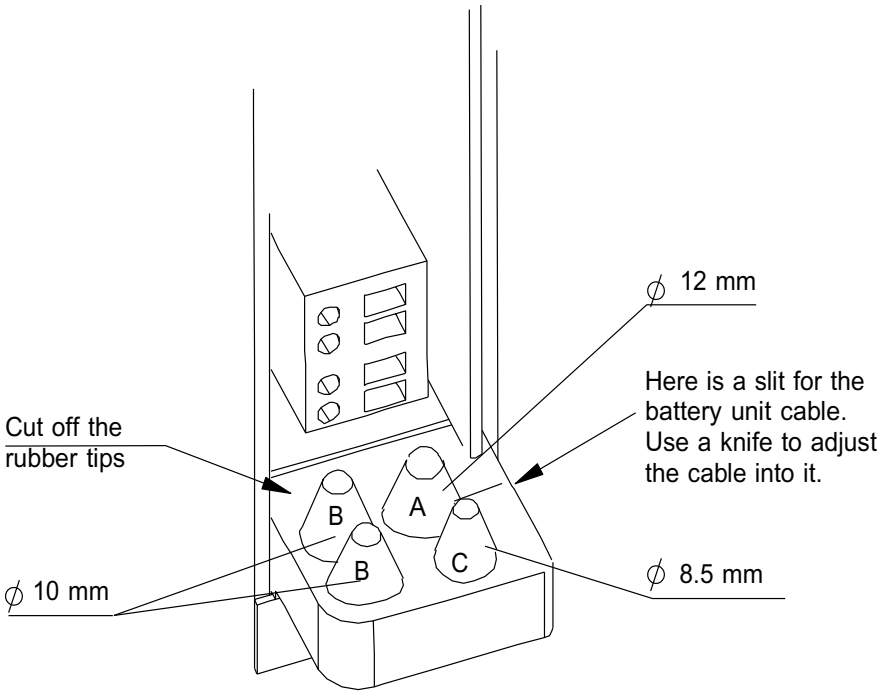



Figure 28. DIPx cable entry sealing; diameters of holes

Table 7. DIPx cable entry sealing; cable information

| Hole | Power cable | Size of cable |
|---|---|---|
| B | AC-input | 3x2.5 $mm^2$/3xAWG 14 |
| A | DC-input | 3x6 $mm^2$/3xAWG 10 (multicore cable) |
| C | −48 VDC output | 2x1.5 $mm^2$/2xAWG 16 |
| B | +55 VDC output | 2x2.5 $mm^2$/2xAWG 14 |
| A | Battery cable | The cable is delivered with the battery. |

Install the power cables in the following, recommended order:

**Steps**

1. **Open the cover of DIPx by loosening the four (or five) Torx-head screws.**

   See figure *DIPx cable entry sealing and cover* above.

   **Further information**

   The cover is attached to the unit with a string to prevent it from dropping.

2. **Connect the −48V DC output cable to the DIPx power interface panel or connect the +55V DC output cable to the DIPx power interface panel or both**

3. **Connect the external DC input cable to the DIPx power interface panel or connect the battery cable to the DIPx power interface panel (if required)**

4. **Connect the AC input cable to the DIPx power interface panel**

5. **After the cabling is completed, close the cover with the screws.**

## 8.2 Connecting the -48V DC output cable to the DIPx power interface panel

**Steps**

1. **Use the appropriate cable route to reach DIPx with the cable.**

   See *Routing external cables through the cable entry of Nokia MetroHub*.

2. **Cut off the rubber tip of the cable entry sealing which is reserved for the -48 V DC cable.**

   Be careful not to cut the hole too wide.

3. **Strip the cable and slide it through the hole in the cable entry sealing.**

   See figure *DIPx cable entry sealing and cover.*

4. **Remove the −48 V DC output fuse.**

5. **Make sure that voltage is off by measuring it from the −48 V DC connector.**

6. **Screw the wires to the -48 V DC connector.**

   Note the polarity!

7. **Put the fuse back.**

## 8.3 Connecting the +55V DC output cable to the DIPx power interface panel

**Steps**

1. **Use the appropriate cable route to reach DIPx with the cable.**

   See *Routing external cables through the cable entry of Nokia MetroHub*.

2. **Cut off the rubber tip of the cable entry sealing which is reserved for the +55 V DC cable.**

   Be careful not to cut the hole too wide.

3. **Strip the cable and slide it through the hole in the cable entry sealing.**

   See figure *DIPx cable entry sealing and cover.*

4. **Remove the +55 V DC output fuse.**

5. **Make sure that voltage is off by measuring it from the +55 V DC connector.**

6. **Screw the wires to the +55 V DC connector.**

   Note the polarity!

7. **Put the fuse back.**

# 8.4 Connecting the external DC input cable to the DIPx power interface panel

**Purpose**

The DC input connectors are delivered with the DIPx unit. They can be found under the DIPx cover in a plastic bag.

**Steps**

1. **Use the appropriate cable route to reach DIPx with the cable.**

   See *Routing external cables through the cable entry of Nokia MetroHub* for instructions.

2. **Cut off the rubber tip of the cable entry sealing which is reserved for this cable.**

---

Note

Be careful not to cut the hole too wide or you may risk the watertightness and strain relief.

---

3. **Slide the cable through the hole in the sealing.**

   See figure *Cable entry sealing*.

4. **Strip the cable for 90 mm.**

   See the following figure.

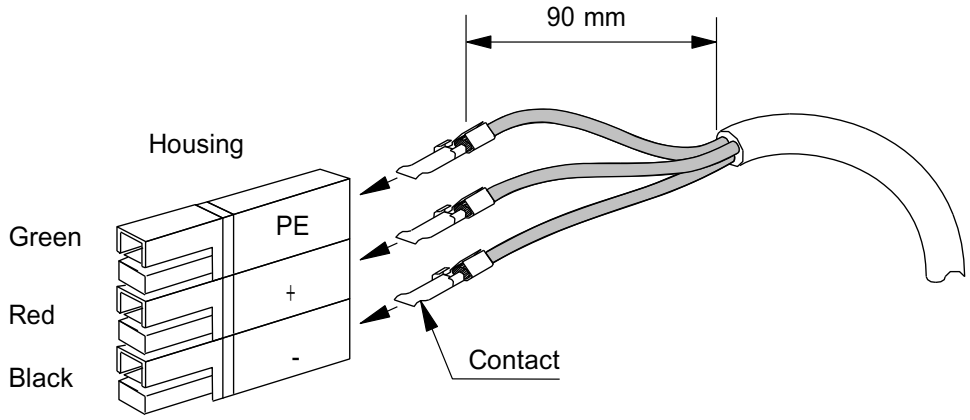



Figure 29. Connecting the DC input cable

5. **Crimp the DC connectors to the wires with the crimping tool.**

6. **Push each contact into the housing, with the hook facing downwards.**

   See the figure above.

7. **Make sure the contacts click when they are inserted to the housing.**

   Note the polarity!

   **Further information**

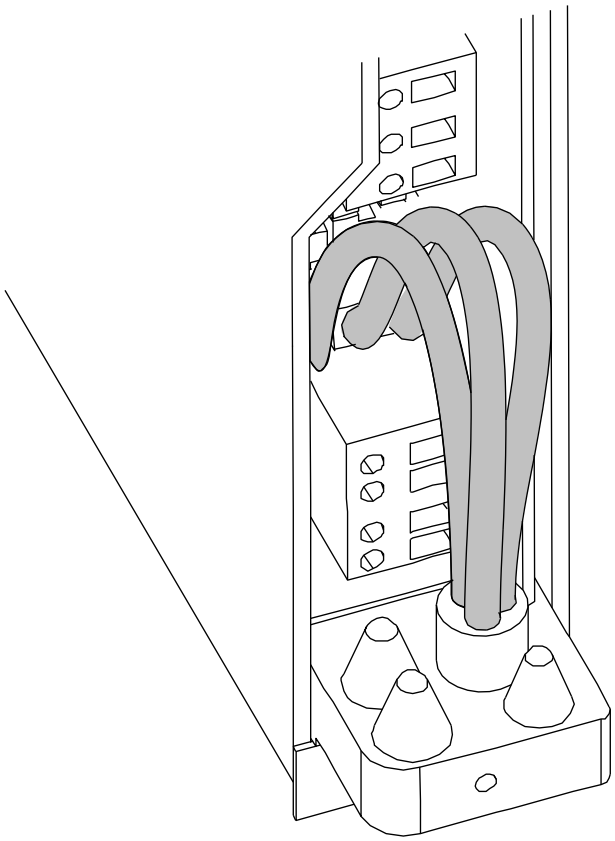


Figure 30. External DC input cable looped inside DIPx

## Note

It is important to strip the cable to the length shown in figure *Connecting the DC input cable* and bend the wires as shown in figure *External DC input cable looped inside DIPx* as it prevents short wires from causing stress to the DC connector when it is connected to the DIPx.

**8. Connect the cable to the external DC input connector.**

See the figure below.

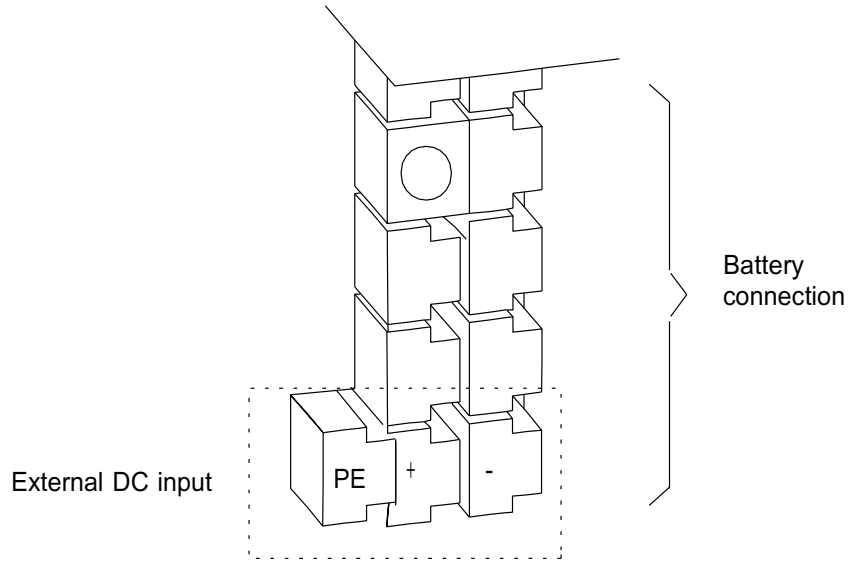



Figure 31. External DC input connector

# 8.5 Connecting the battery cable to the DIPx power interface panel

**Summary**

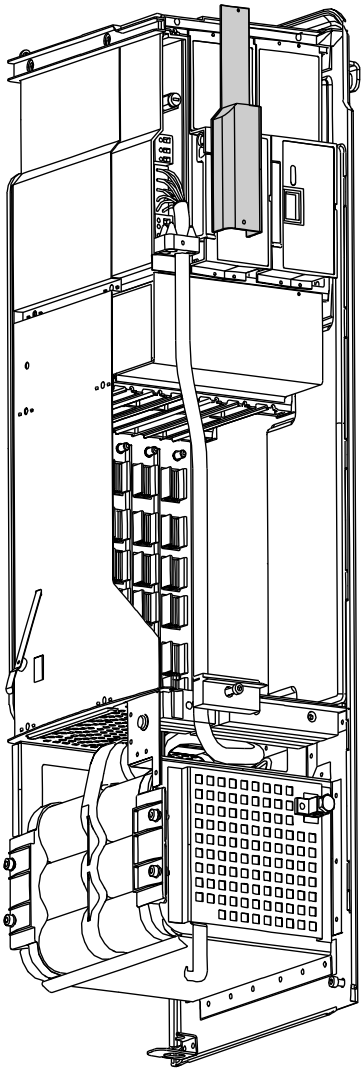


Figure 32. Routing the battery cable

**Steps**

1. **Use the appropriate cable route to reach DIPx with the cable.**

See *Routing external cables through the cable entry of Nokia MetroHub* and the figure above.

2. **Cut off the rubber tip of the cable entry sealing which is reserved for this cable.**

---

Note

Be careful not to cut the hole too wide.

---

3. **Push the connectorised cable into the hole through the slit on the right side of the sealing.**

   See figure *DIPx cable entry sealing; diameters of holes*.

   Use a knife to enlarge the slit if necessary.

4. **Plug the battery cable in.**

5. **Leave extra slack in the cable to ensure that the fan unit can be pulled out without loosening of the battery cable.**

## 8.6 Connecting the AC input cable to the DIPx power interface panel

**Steps**

1. **Use the appropriate cable route to reach DIPx with the cable.**

   See *Routing external cables through the cable entry of Nokia MetroHub*.

2. **Cut off the rubber tip of the cable entry sealing which is reserved for this cable.**

   Be careful not to cut the hole too wide.

3. **Strip the cable and slide it through the hole in the cable inlet sealing.**

   See figure *DIPx cable entry sealing and cover.*

4. **Screw the wires to the AC connector.**

Note the polarity!

# 9 Connecting unit cables

## 9.1 Connecting interface cables to the interface unit (DIUx)

**Summary**

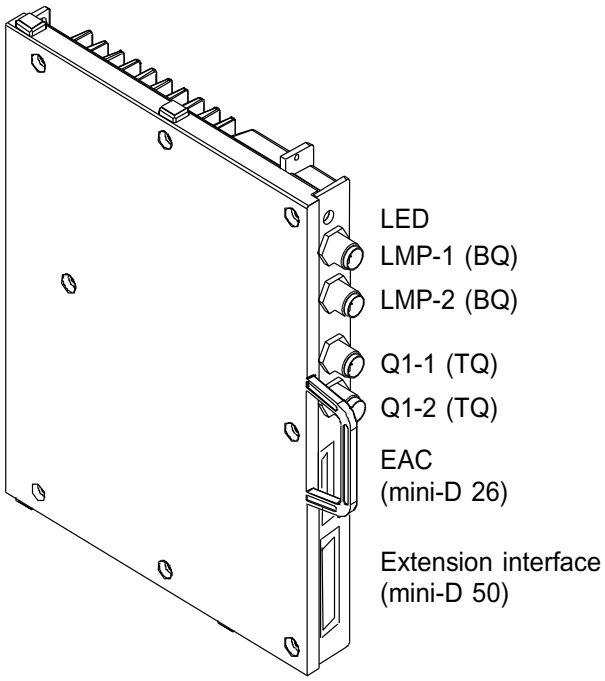



Figure 33. The connectors of the interface unit (DIUx)

**Steps**

1. To connect LMP or Q1 cables

**Before you start**

Note

Connect the LMP cable from your manager-PC to the LMP connector (BQ) just before starting the commissioning.

**Steps**

**a. Use the appropriate cable route to reach DIUx with the cable.**

See *Routing external cables through the cable entry of Nokia MetroHub*.

**b. Connect the cable to the corresponding connector on the DIUx.**

2. To connect the external alarm and control cable

**Before you start**

Note

The cable must be shielded.

**Steps**

**a. Use the appropriate cable route to reach DIUx with the cable.**

See *Routing external cables through the cable entry of Nokia MetroHub*.

**b. Connect the cable to the EAC connector (26-pin mini D) on the DIUx.**

3. To connect the D-bus cable

**Steps**

**a. Remove the two M2.5x6 screws at both ends of the D-bus connector unit (mini-D 50).**

**b. Remove the weather seal from the D-bus connector unit.**

**c. Mount the Adapter Gasket and Adapter body to the extension interface of the DIUx.**

Mount the Adapter Gasket and Adapter body to the extension interface of the DIUx, in that order. Secure them with two M2.5 Torx-head screws.

**d. Tighten the Torx-head screws in torque until the adapter frame touches the front of the plug-in unit.**

When tightening the screws in torque, the gasket will expand inside the adapter frame. Stop when the adapter frame touches the face of the plug-in unit.

---

Caution

If too much torque is applied to the screws, you may damage the threads in the aluminium body of the plug-in unit.

---

**e. Attach the D-bus connector to the extension interface.**

The cable is marked 'MetroHub' on the end that should be connected to MetroHub (see a). The other end of the cable is marked with the name of the BTS.

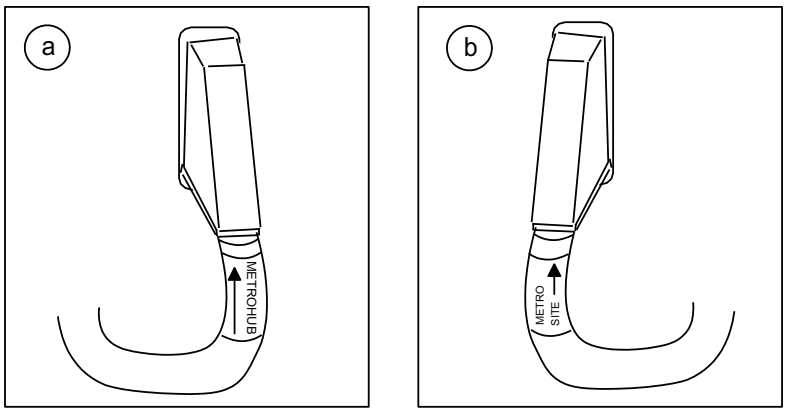
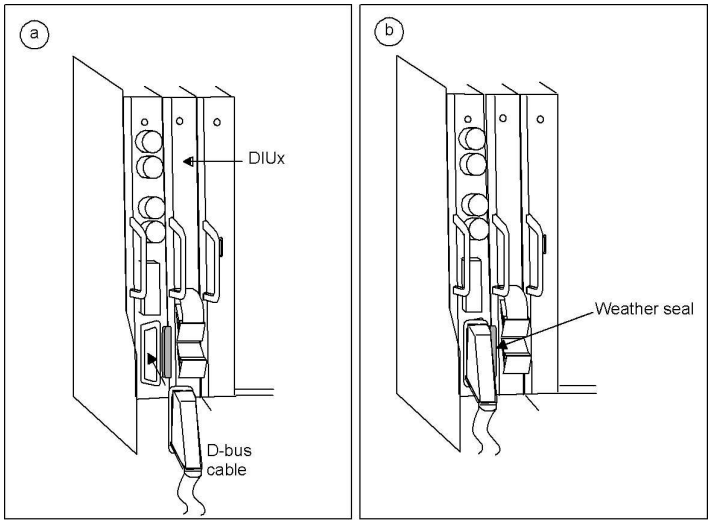



Figure 34. D-bus connectors

**f. Check that the rubber shield is secure over the adapter.**




**Further information**

---

Note

Make sure that the cable connector and shrinking sleeve combination is not too long. Otherwise the cable will not have enough space to bend when you install the cabinet cover.

---

---

Note

The extension interface can be used for connecting a BTS via D-bus chaining.

---

# 9.2 Connecting cables to the FXC E1 transmission unit

**Summary**

FXC E1 has four pairs of 75 Ω connectors (type BT-43). Each pair forms a transmission interface (IF). The upper connector is always the Tx connector of any given transmission interface. The lower connector is always the Rx connector of any given transmission interface.

---

Note

It is possible to use IF4 as a synchronisation interface by connecting a synchronisation cable to it.

---

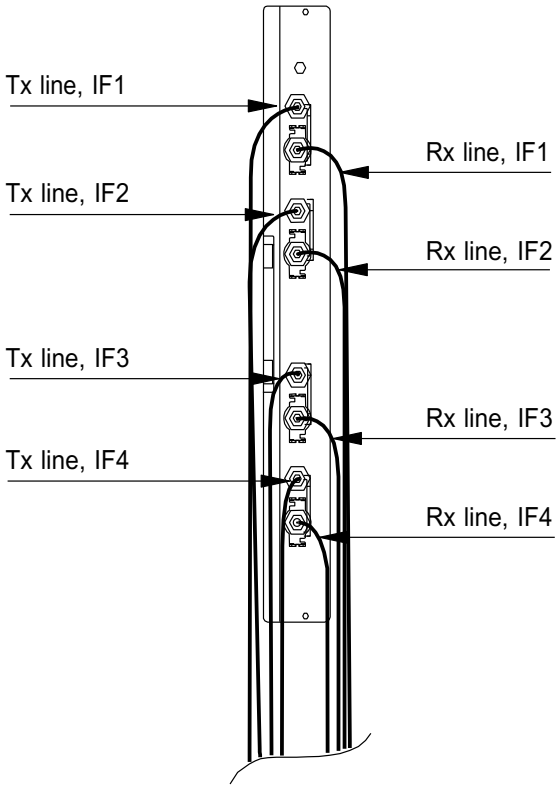



Figure 35. Cabling of FXC E1

### Steps

1. **Connect the connector of the received (Rx) signal line to the 75 Ω Rx connector on the IF1.**

2. **Connect the connector of the transmitted (Tx) signal line to the 75Ω Tx connector on the IF1.**

3. **Cable the other IFs in the same manner.**

   See the figure above.

4. **Make sure that the cable connector and shrinking sleeve combination is not too long so that the cable has enough space to bend when you install the cabinet cover.**

### Further information

*Grounding the Rx connector*

The grounding of Rx connector of FXC E1 is implemented with a grounding washer under the Rx connector. It connects the outmost wires of the connector.

To ground the outmost wire of Rx connector directly, leave the grounding washer in place.

To ground the outmost wire of Rx connector capacitively, remove the grounding washer. Loosen the connector and pull the grounding washer off. Store it for future use.

---

Note

Remember to tighten the connector properly after the grounding washer has been removed! The torque is 1.5 Nm (1.11 ft-lb).

---

## 9.3 Connecting cables to the FXC E1/T1 transmission unit

### Summary

FXC E1/T1 has four 100/120 Ω Tx/Rx connectors (type TQ).

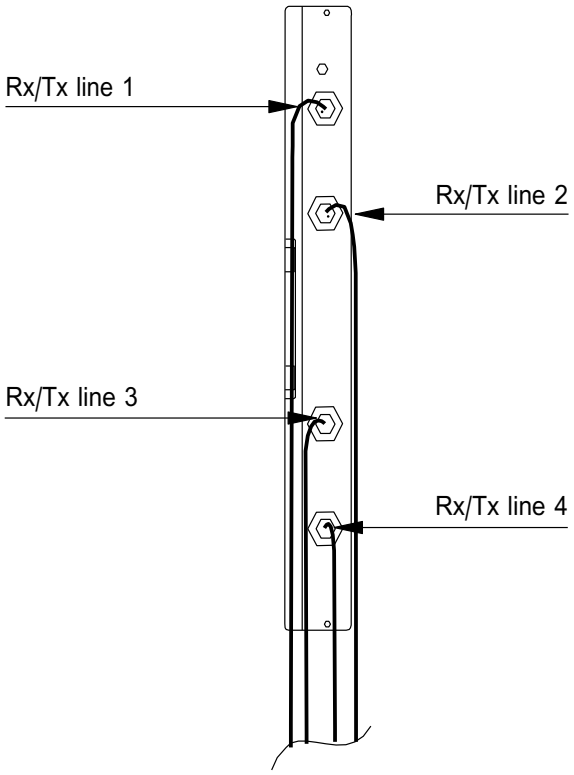



Figure 36. Cabling of FXC E1/T1

**Steps**

1. **Connect the connectors of Tx/Rx signal lines to the 100/120 Ω Tx/Rx connectors on the FXC E1/T1 front panel.**

2. **Tighten the connector nut properly.**

   The torque needed is 2 Nm (1.5 ft-lb).

3. **Make sure that the cable connector and shrinking sleeve combination is not too long so that the cable has enough space to bend when you install the cabinet cover.**

# 9.4 Connecting the Flexbus cable to the FXC RRI transmission unit

**Summary**

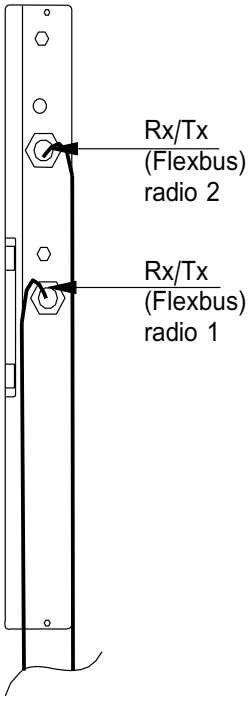



Figure 37. Cabling of FXC RRI

**Steps**

1. **Connect the coaxial Rx/Tx (Flexbus) cable from the radio outdoor unit to the TNC connector(s) on the FXC RRI transmission unit.**

2. **Tighten the connector nut properly.**

   The torque needed is 2 Nm.

3. **Make sure that the cable connector and shrinking sleeve combination is not too long so that the cable has enough space to bend when you install the cabinet cover.**

# 9.5 Connecting cables to the FXC STM-1 transmission unit

**Summary**

The FXC STM-1 transmission unit has two long-haul, optical STM-1 interfaces.

Connect fibre cables to FXC STM-1 with care. The fibre is very sensitive and can easily be damaged.

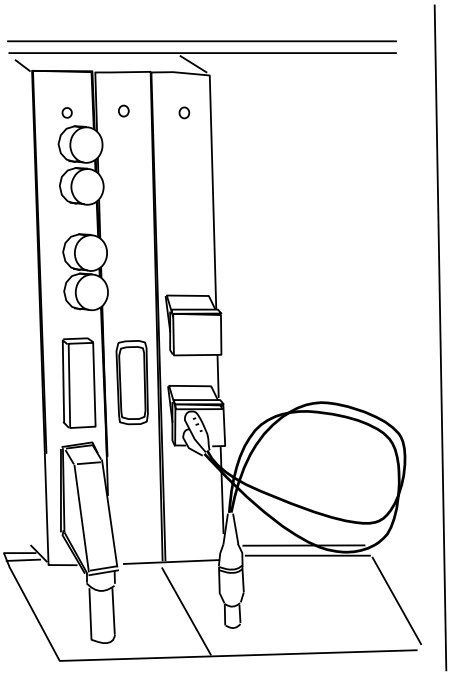


Figure 38. Installation example of fibre within the cabinet

Note

Do not put the fibre under permanent tensile stress. Never bend the optical cable below the minimum bending radius of 75mm.

**Steps**

**1. Remove the protective caps from the LC connector plugs.**

Note

Do not touch the connector tips with your fingers.

**2. Feed the LC connector plugs into the LC holes in the weather cover.**

Feed the LC connector plugs into the LC interface holes in the weather cover. Take care not to strain the small latch lever of the LC connector plug.

**3. Connect the transmitter (Tx) fibre cable to the upper optical port.**

**4. Connect the receiver (Rx) fibre cable to the lower optical port.**

**5. Slide the weather cover over the LC connector.**

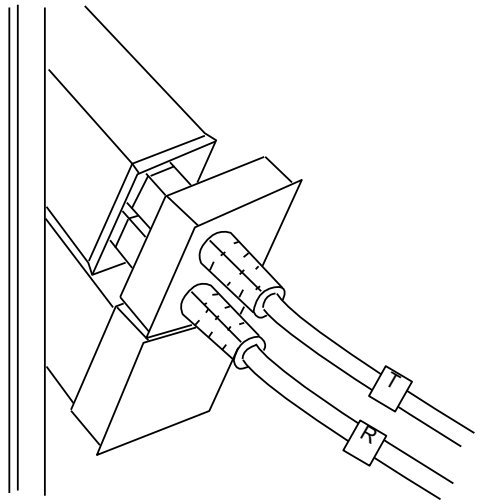



Figure 39. LC connectors with weather covers plugged into FXC STM

**6. Make sure the lips of the rubber shield are properly in place over the LC connector.**

**Expected outcome**

The fibre optic cables are connected to the LC plugs on the FXC STM-1 transmission unit. The weather cover is in place.

### Further information

## Note

If the receiving power is above -10 dBm, attenuate the optical input power in order to prevent the laser module module from damage.

# 10 Routing the cables of Nokia MetroHub

## 10.1 Routing external cables through the cable entry of MetroHub

**Summary**

All the external cables are routed to MetroHub from the cable entry (see the figure below). Cables going further than the battery tray must be routed through the cable entry sealing which prevents water and air flow from drifting to the connector area. The sealing consists of two parts: the sealing block on the right is for transmission unit cables and the sealing block on the left for other cables.

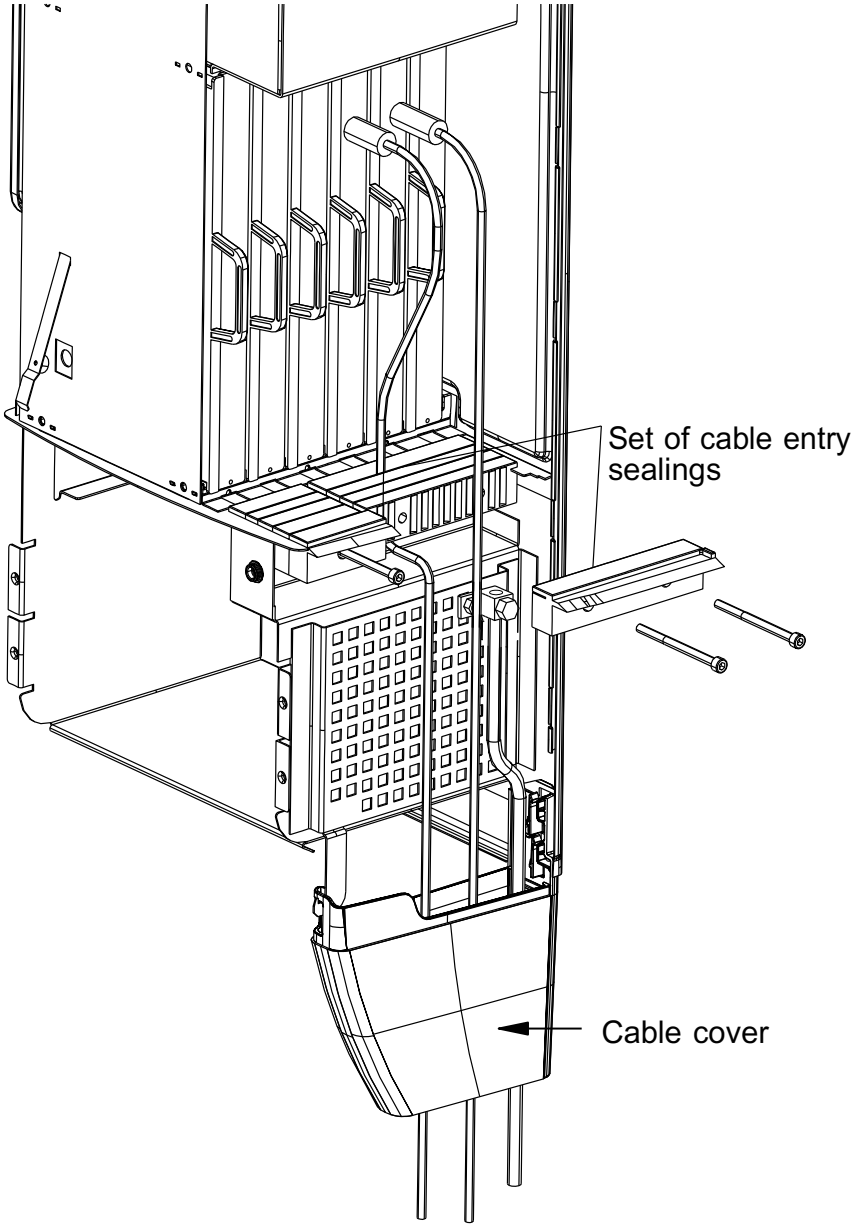



Figure 40. Cable entry

*Recommended cable positioning in cable entry sealing*

Power cables and interface unit cables are fixed to the left part of the sealing. Transmission cables are positioned to the right, directly under the transmission units.

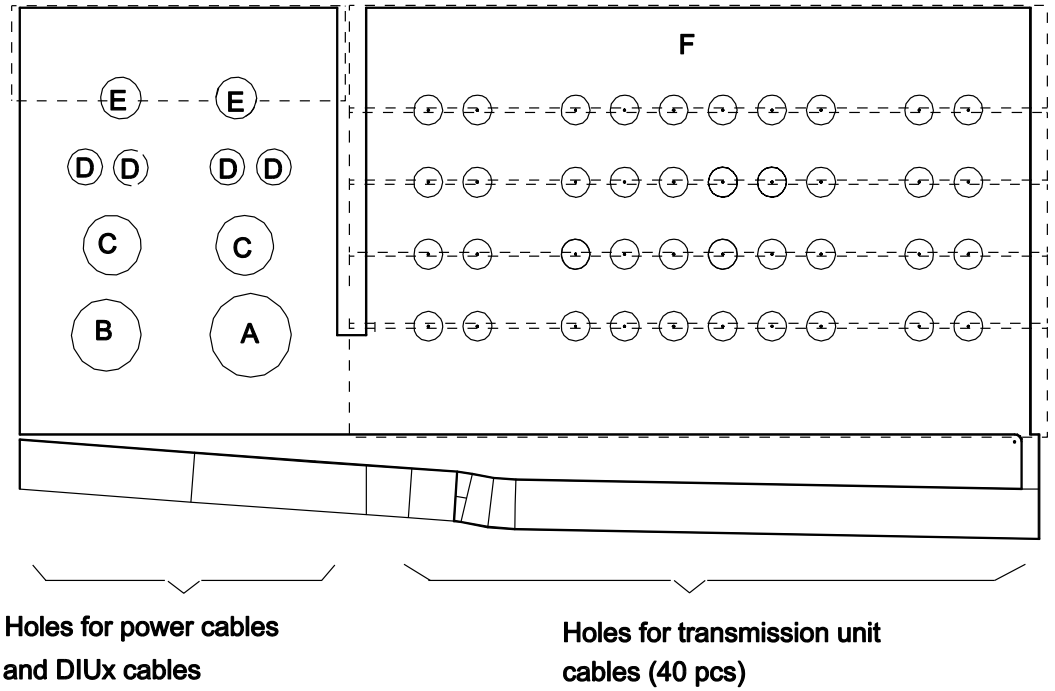



Figure 41. Cable entry sealing

Table 8. Diameters of the holes in the cable entry sealing

| Hole | Diameter (mm) | Cable |
|---|---|---|
| A | 14 | Battery cable / DC-input cable |
| B | 12 | AC input |
| C | 10 | +55 V DC output; external alarms; D-bus cable |
| D | 6 | Permanent cabling for LMP and Q1 |
| E | 7 | -48 V DC output |

Table 8. Diameters of the holes in the cable entry sealing (cont.)

| Hole | Diameter (mm) | Cable |
|---|---|---|
| F | 6 | Transmission unit cables |

*Cable fixing to the battery tray*

Cables going out from the node are recommended to be fixed with cable ties to the metal net on the side of the battery tray, below the cable sealing. If there is no need for strain relief because the cables are, for example, fixed firmly to the wall on which the equipment has been mounted, this fixing is not necessary.

**Steps**

1. **Open the screws that keep the cable entry sealing closed.**
2. **Split the sealing at appropriate places and route the cables through the cable holes.**
3. **Close the sealing with the screws.**

---

Note

Leave enough slack in the cables to avoid strain.

Make sure that the cable connector and shrinking sleeve combination is not too long. Otherwise the cable will not have enough space to bend when you install the MetroHub cover.

---

## 10.2 Mounting the cabinet cable cover

**Summary**

When the cabling has been completed, attach the cabinet cable cover (see figure *Cable entry*) to the cable cover support.

### Steps

**1. Press the cable cover against the cable cover support until it locks to the cable cover support.**

### Expected outcome

The cable cover has been mounted to the cable cover support.

# 11 Assembling Nokia MetroHub core mechanics

## 11.1 Overview of assembling Nokia MetroHub core mechanics

**Purpose**

The suggested working order for assembling Nokia MetroHub core mechanics is as follows.

**Steps**

1. **Mount the cabinet cover.**
2. **Paint the cabinet cover (optional).**
3. **Install the cabinet lock.**

## 11.2 Mounting the cabinet cover

**Before you start**

The cabinet shields the equipment against water, snow or solid foreign objects. A separate lock must be installed at the bottom of the cabinet for locking the cover.

**Steps**

1. Mount the cover.

**Summary**

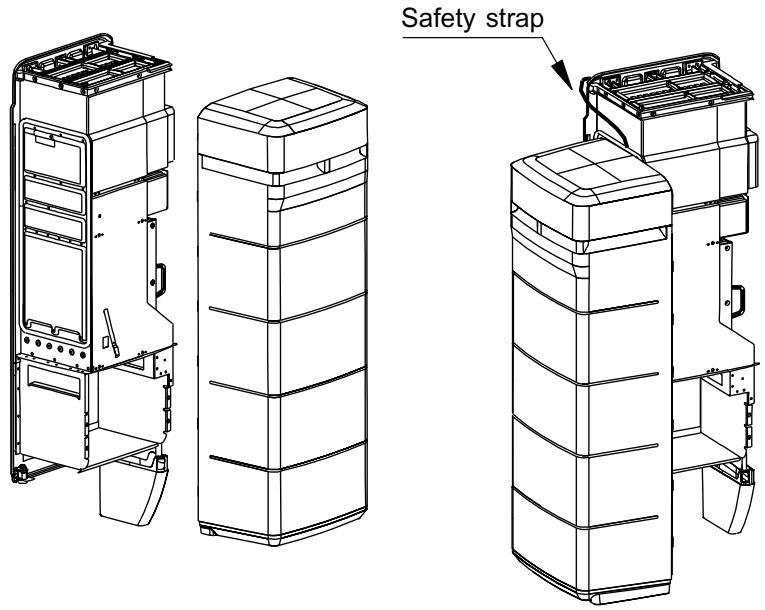



Figure 42. Cabinet cover

## Note

Use the safety strap to secure the cover even if you do not hang the cover during installation.

**Steps**

**a. Bring the cover to the cabinet.**

**b. Attach a safety strap to the provided fixing point on top of the cabinet.**

**c. Hang the cover on the hook at the left side of the cabinet.**

**2. If the lock is not in place, install the cabinet lock at the bottom of the cabinet.**

**3. Align the locking guides on the cover to the locking recesses at the sides of the cabinet and attach the cabinet cover (after commissioning).**

Make sure no cables are clamped between the cover and the chassis.

4. **Lock the cabinet.**

5. **Clean the site.**

   Recycle any applicable material.

6. **Fill in all necessary forms.**

## 11.3 Painting the cabinet cover

### Purpose

The cover of MetroHub shields the equipment against water, snow or solid foreign objects. If desired, the MetroHub cover can be painted to make it better blend into the surrounding environment.

### Before you start

Nokia recommends that you use a primer-topcoat combination of Beckers TD 130 primer (for priming) and Beckers TH 141 paint (for surface painting) for painting the cover. Other paints suitable for polycarbonate surfaces may also be used.

Caution

Do not use any paint that contains alkalis, esters, ketones, aromatic, chlorinated, or fluorinated hydrocarbons, since these may damage the cover. Paint containing these chemicals can only be used if approved by the manufacturer for painting polycarbonate objects.

The selected paint must be UV and weather-resistant and suitable for temperatures ranging from -40°C to +50°C (-40°F to 122°F). For environmental conditions, refer to ETS 300 019-1-4:1992 class 4.1.

### Steps

1. **Remove the cabinet cover.**

Unlock the cabinet, push the cabinet cover from both sides and lift it until the locking guides at the sides come out from the locking recesses. Place the cabinet cover on the floor or hang it on the hook at the side of the cabinet with the safety strap.

---

Note

Removing the cabinet cover triggers an alarm in the manager.

---

**2. Detach the cable cover and the cable cover support from each other.**

Detach the cable cover and the cable cover support from each other to prevent them from stucking to each other by paint and to ensure that paint is applied evenly. The cover top can also be detached from the cover by unscrewing the Torx T20 screws.

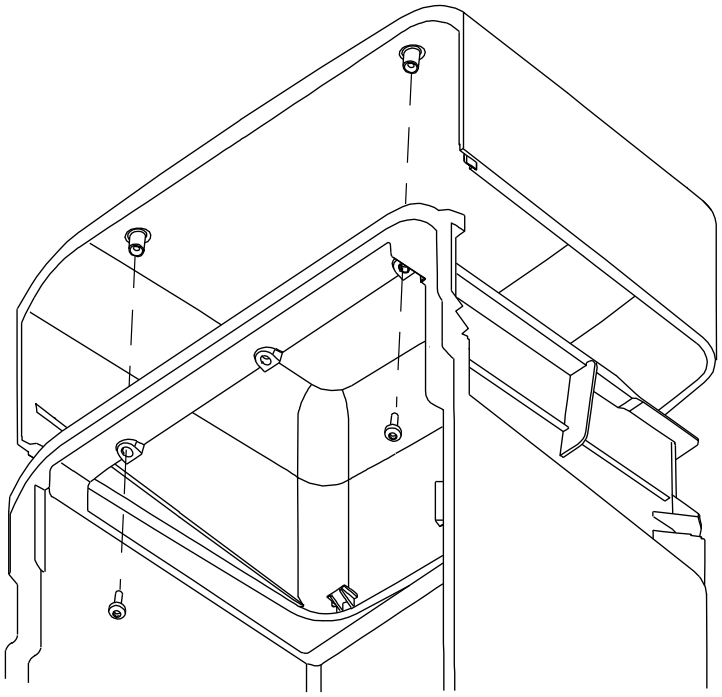


Figure 43. Removing the cover top

**3. Clean the surface of the cover.**

Clean the surface of the cover of stains and dust with an alcoholic or acidic wash, or wipe it clean with a piece of cloth moistened with water and mild washing agent.

Caution

Do not use washing agents that contain alkalis, aromatic, chlorinated, or fluorinated hydrocarbons, esters or ketones.

4. **Rinse with water to remove residuals of cleaning chemicals.**

5. **Dry the cover parts by blowing ionized air on them to remove electrostatic charges and dust particles.**

6. **Place a support under the cover and the cover top so that you do not have to touch the parts during painting.**

7. **Use a clamp or hook for holding the cable cover and the cable cover support during painting.**

   Use a clamp or hook for holding the cable cover and the cable cover support during painting. The following figure shows areas on which to place the clamp.

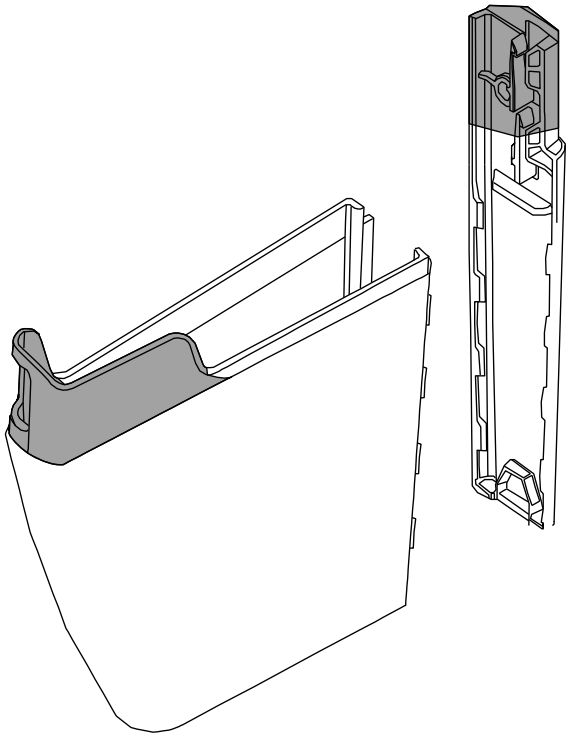


Figure 44. Areas used for holding the cable cover parts during painting

**8. Spray paint over the outside surface of the cover.**

Spray paint over the outside surface of the cover. You should spray the paint in room temperature with relative air humidity of 50-65%.

---

Note

The maximum thickness of the paint should not exceed 100 µm.

---

**9. Dry the parts.**

Dry the parts, either in an oven or by letting the paint dry in room temperature according to the paint manufacturer's drying instructions.

---

Note

The temperature of the drying oven must not exceed 90 °C (194°F).

**10. After the paint is dry, attach the cover top to the cover.**

After the paint is dry, attach the cover top to the cover. Tighten the screws to 1.6 Nm (1.18 ft-lb).

## 11.4 Installing the cabinet lock

**Steps**

**1. Insert the lock mechanism in the lock bracket.**

Insert the lock mechanism in the lock bracket at the bottom of the cabinet. See the following figure.

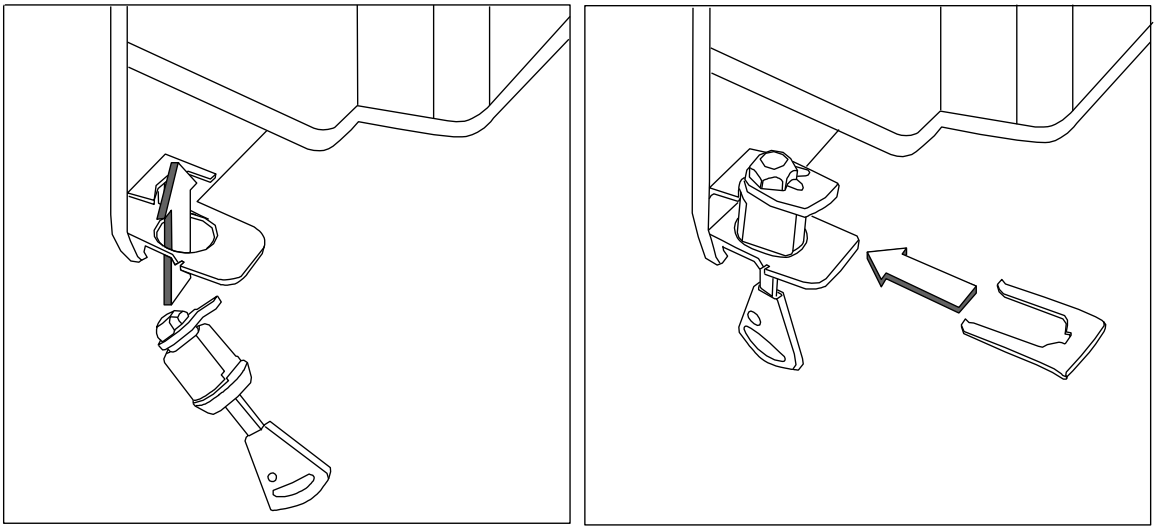


Figure 45. Installing the cabinet lock

**2. Attach the lock clip to secure the lock mechanism.**

**Expected outcome**

The lock is installed successfully.

# 12 Checklist for installing Nokia MetroHub

Table 9. Checklist for installing Nokia MetroHub

| Check | Instructions | Expected outcome | Check mark |
|---|---|---|---|
| Have you surveyed and prepared the site needs? | See:<br>• *Overview of site requirements for Nokia MetroHub*<br>• *Environmental requirements for Nokia MetroHub*<br>• *Storage conditions for Nokia MetroHub*<br>• *Transportation conditions for Nokia MetroHub*<br>• *Operating conditions for Nokia MetroHub*<br>• *Space requirements for Nokia MetroHub*<br>• *Pole/wall requirements for the cabinet*<br>• *Tools requirements for Nokia MetroHub*<br>• *Torque settings of Nokia MetroHub*<br>• *Overview of power requirements for Nokia MetroHub*<br>• *Grounding (earthing) requirements for Nokia MetroHub* | The site is in line with the *environmental requirements*.<br>*Operating conditions* are met.<br>*Space requirements* and storage conditions are met.<br>*Transportation requirements* are met.<br>*Storage conditions* are met.<br>*Pole/wall* and *tools* requirements are met.<br>*Power requirements* are met.<br>*Grounding (earthing) requirements* are met. | |

Table 9. Checklist for installing Nokia MetroHub (cont.)

| Check | Instructions | Expected outcome | Check mark |
|---|---|---|---|
| Have you installed Nokia MetroHub? | See:<br>• *Overview of installing Nokia MetroHub*<br>• *Overview of preparing to install Nokia MetroHub*<br>• *Site preparation checklist for Nokia MetroHub*<br>• *Unpacking and inspecting the Nokia MetroHub delivery*<br>• *Removing the cabinet cover*<br>• *Removing units from the Nokia MetroHub cabinet to enable installation* | Nokia MetroHub is installed. | |
| Have you selected one of the two options of mounting Nokia MetroHub? | See:<br>• *Overview of wall mounting the cabinet*<br>• *Overview of pole mounting the cabinet* | The mounting option is selected. | |
| Have you installed the units of Nokia MetroHub? | See:<br>• *Overview of installing the units of Nokia MetroHub*<br>• *Installing a power supply unit (DSUx) in Nokia MetroHub*<br>• *Installing an optional battery unit (DBBx) in Nokia MetroHub* | The units are installed. | |
| Have you cabled Nokia MetroHub? | See:<br>• *Overview of cabling Nokia MetroHub*<br>• *Connecting the antistatic wrist strap to Nokia MetroHub*<br>• *Connecting the main grounding conductor to Nokia MetroHub* | Nokia MetroHub is cabled. | |

Table 9. Checklist for installing Nokia MetroHub (cont.)

| Check | Instructions | Expected outcome | Check mark |
|---|---|---|---|
| Have you connected the power cables? | See:<br>• *Overview of connecting power cables to Nokia MetroHub*<br>• *Connecting the -48V DC output cable to the DIPx power interface panel*<br>• *Connecting the +55DC output cable to the DIPx power interface panel*<br>• *Connecting the external DC input cable to the DIPx power interface panel*<br>• *Connecting the battery cable to the DIPx power interface panel*<br>• *Connecting the AC input cable to the DIPx power interface panel* | The power cables are connected. | |
| Have you connected the unit cables? | See:<br>• *Connecting interface cables to the interface unit (DIUx)*<br>• *Connecting cables to the FXC E1 transmission unit*<br>• *Connecting cables to the FXC E1/T1 transmission unit*<br>• *Connecting the Flexbus cable to the FXC RRI transmission unit*<br>• *Connecting cables to the FXC STM-1 transmission unit* | Unit cables are connected. | |
| Have you routed the cables of Nokia MetroHub? | See:<br>• *Routing external cables trough the cable entry of Nokia MetroHub*<br>• *Mounting the cabinet cable cover* | The cables of Nokia MetroHub are routed. | |

Table 9. Checklist for installing Nokia MetroHub (cont.)

| Check | Instructions | Expected outcome | Check mark |
|---|---|---|---|
| Have you assembled Nokia MetroHub core mechanics? | See:<br>• *Overview of assembling Nokia MetroHub core mechanics*<br>• *Mounting the cabinet cover*<br>• *Painting the cabinet cover*<br>• *Installing the cabinet lock* | Nokia MetroHub core mechanics have been assembled. | |

# Related Topics

## Delivery content of Nokia MetroHub transportation package

### Instructions

Unpacking and inspecting the Nokia MetroHub delivery

### Descriptions

Technical overview of Nokia MetroHub hardware

## Overview of installing Nokia MetroHub

### Instructions

Unpacking and inspecting the Nokia MetroHub delivery

Removing units from the Nokia MetroHub cabinet to enable installation

Overview of wall mounting Nokia MetroHub

Overview of pole mounting Nokia MetroHub

Connecting the main grounding conductor to Nokia MetroHub

Overview of installing the units of Nokia MetroHub

Overview of connecting power cables to Nokia MetroHub

Connecting interface cables to the interface unit (DIUx)

Connecting the Flexbus cable to the FXC RRI transmission unit

Connecting cables to the FXC E1 transmission unit

Connecting cables to the FXC E1/T1 transmission unit

Connecting cables to the FXC STM transmission unit

Connecting cables for commissioning Nokia MetroHub

Mounting the cabinet cable cover

Mounting the cabinet cover

Painting the cabinet cover

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Installing transmission node manager software from Nokia SiteWizard

Overview of preparing to commission Nokia MetroHub

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# Site preparation checklist for Nokia MetroHub

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Attaching the mounting rack to the wall

Attaching the cabinet to the mounting rack

# Attaching the mounting rack to the wall

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Overview of wall mounting the cabinet

Attaching the cabinet to the mounting rack

# Attaching the cabinet to the mounting rack

Overview of wall mounting the cabinet

Attaching the mounting rack to the wall

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# Attaching the pole brackets and mounting rack to the pole

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Installing a power supply unit (DSUx) in Nokia MetroHub

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Connecting the antistatic wrist strap to Nokia MetroHub

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# Connecting the main grounding conductor to Nokia MetroHub

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Warnings and cautions

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# Connecting interface cables to the interface unit (DIUx)

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# Routing external cables through the cable entry of MetroHub

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Overview of installing Nokia MetroHub

# Overview of assembling Nokia MetroHub core mechanics

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Mounting the cabinet cover

Painting the cabinet cover

Installing the cabinet lock

# Mounting the cabinet cover

## Instructions

Installing the cabinet lock

# Painting the cabinet cover

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Overview of assembling Nokia MetroHub core mechanics